G S

CLAVIS
PHARMACOPŒIA
COLLEGII DUBLINENSIS:

OR, A

TRUE KEY TO THE PHARMACOPŒIA

OF THE

KING AND QUEEN'S

College of Physicians

IN IRELAND.

By T. G. Carroll

Dublin:
PRINTED FOR THE AUTHOR.
1825.

TO THE

GENTLEMEN STUDYING PHARMACY,

AND

PREPARING FOR EXAMINATION,

THIS LITTLE WORK

Is Presented,

AS A MARK OF ATTENTION TO THEIR WELFARE, AND AS A PROOF OF THE
AUTHOR'S CONCERN FOR THEIR INTEREST.

PREFACE.

ALTHOUGH I have been fully aware of the hazard incurred by presenting the *Clavis Dispensatoria* to the Public, who are already in possession of the elaborate Works of Thompson and Duncan, yet I am still induced to flatter myself, that the present attempt will prove neither superfluous nor uninteresting; for, notwithstanding the acknowledged accurácy displayed by the above authors, it is presumed that the present is such as to unite every advantage resulting from their labours, beside many others peculiar to this Work alone. By this combination, the utility of the following pages, as a guide to a complete knowledge of the Dispensatory, is rendered essentially superior to any preceding Work upon the subject. As it is the province of the human mind to advance in its researches, we ought not to rest satisfied with what is already accomplished, when any thing remains to be done; though we may admire the genius which could make such considerable advances towards the end in view, we must yet (with submission) be allowed to amend what is evidently defective. But Chemists, in general, are so fond of, and wedded to, their own theories, and (if I may be allowed to speak chemically) their affinities, their ultimate and proximate principles are so repulsive to each other, that it would be impossible to find any one book which could act as an intermedium in causing a chemical union between them. I am not so vain as to expect I can escape censure more than the most learned; but every Apothecary must not hope to be a Davy, a Thompson, a Brand, or a Parkes. It is ambition enough for me to be employed as an under labourer in culling the simples, and removing any heterogeneous matter which might impede the progress of the more analyzing Chemist.

If I have not the good fortune to please every one, still no person should be offended with me, as I have sincerely aimed at usefulness, though I may unhappily not have succeeded. Therefore, the goodness of my intention, I hope, ought to be some excuse for the inutility of my labour.—There have been many motives, which, in my mind, seemed to impose it as a duty incumbent upon me to undertake this Work; and these became more and more imposing the more I conversed with my Fellow-Students on the many disadvantages and inabilities which they had to contend with. To enumerate these disadvantages would be here impolitic, as the recital of them, might give offence to both Master and Apprentice.

To obviate these difficulties, many of which I never had to contend with, I have endeavoured to make this Book as concise as the subject would admit of; and, in order to render the Work more adapted to the capacity of the Learner, I have methodically arranged each preparation as it occurs in the *Dublin Pharmacopœia*, in the form of Question and Answer. It is evident to the dullest capacity, that a Student who will practice himself in this manner of answering, will feel no difficulty on the day of trial, when he shall offer himself as a candidate for Master. With the fixed resolution of insuring success, and that great pleasure of mind which is known to those only who have had the happiness to experience it, this Work has been undertaken. The Irish Author, who has always been actuated by the strongest feelings of sympathy for his Fellow-Students, now offers his little Volume to their impartial consideration; impressed with the hope, that, if they find the style less attended to than the subject, the reader will please to remember, that the advantages of the one, more than compensate for the inaccuracies of the other. Under the auspices of your candour and kind consideration, allow me, then, to remind you, to impress it strongly on your memory, that if the Author has failed in his attempt at usefulness, yet his intentions were well meant.

I am, with feelings deeply interested for your welfare, Gentlemen, your devoted Servant.

T. G. C.

ADVERTISEMENT.

READER,

TO study the following pages with ease and advantage to yourself, it is requested that you will never proceed to read this Book, without having the *Dublin Pharmacopœia* before you. Dare I suggest a plan of study to you, it would be that one which I invariably adopted myself; namely, I first read the preparation three or four times over in the *Pharmacopœia*, and then proceeded to ask myself the reason why I did so and so at each step of process. By following this method every preparation became easy and intelligible. At the end of this Work, the Student will find a list of those Medicines, which are exhibited at the Hall.

The appearances, both of the good and the bad specimens, I would advise every Student to be scrupulously attentive to, and familiar with.

CALORIC.

Q. What is Caloric?

A. A substance, the evolution of which causes in us that sensation which we denominate heat.

Q. How many sources of Caloric?

A. Six, viz.—the rays of the Sun, combustion, percussion, friction, electricity, and galvanism.

Q. Do all bodies contain Caloric?

A. Yes, Caloric pervades all bodies that we are acquainted with.

Q. If Caloric exists in all bodies, how is it that polished iron or steel feels so cold?

A. You must observe, that although Caloric is uniform in its nature, yet there may exist in all bodies two portions of Caloric, quite distinct from each other.

Q. How are they distinguished?

A. That one which will effect the thermometer, is called free or sensible Caloric; the other will not effect the thermometer, and is called latent, or dormant, or combined Caloric.

Q. Give me an example of latent and sensible Caloric existing in a body at one and the same time?

A. Take a piece of iron, and let it be briskly hammered, for some time, on an anvil; it will soon become nearly red hot; this is what we call sensible Caloric, but still there remains some Caloric behind, which forms a constituent part of the iron itself, and this is what we name latent or combined Caloric; or it may be shewn how a substance can exist in one body in two distinct states, by the familiar example of a piece of bread dipped in water. Now, it is evident, that this bread will contain two portions of water, very distinct from each other; the one can be forced out by pressure, this we liken to free Caloric; the other cannot be forced out, but forms a constituent part of the bread, and this will represent latent Caloric.

Q. You have said that iron will give out its latent Caloric when hammered, why does it do so?

A. Caloric is supposed to insinuate itself between the particles of all bodies, and cause those particles to recede from each other; therefore, when iron is hammered, those particles of the iron are made to approximate each other, so that atoms of Caloric are then expelled.

Q. What is the cause of fluidity?

A. Caloric.

Q. Does Caloric cause all bodies to expand?

A. Yes, except Argilla, which has the peculiar property of contracting, when heated.

Q. How many degrees of heat mentioned in the Dublin C.?

A. Three; by highest, they understand from 200 to 212; by a medium degree, they mean from 100 to 200; and by the lowest degree of heat, they mean from 90 to 100.

Q. How are those degrees of heat measured?

A. By Fahrenheit's thermometer.

Q. What are the boiling and freezing points of water on Fahrenheit's thermometer?

A. The boiling 212, the freezing 32.

Q. What heat does the D. C. order in the operation of digestion?

A. The lowest; and in macuration from 60 to 90.

Q. When a solid substance is rendered permanently uniform by heat, what is it called?

A. A Gas.

Q. Why is it called a Gas?

A. To distinguish it from vapour and those other aireform substances which return to their solid or fluid state when heat is abstracted.

Q. What are the constituents of a Gas?

A. Caloric, combined with some solid base.

Q. Why do Gases exist so permanently in their gaseous state?

A. Owing to the strength of affinity existing between Caloric and their bases, which affinity resists every reduction of temperature.

Q. What is Oxygen?

A. A simple substance, a peculiar invisible, elastic Gas, the acidifying principle and supporter of life and combustion.

Q. When Oxygen combines with substances, what do they become?

A. Oxides and Acids.

Q. What is an Oxide?

A. Oxygen combined with a metal or combustible, having no acid properties.

Q. What is Hydrogen?

A. It is an invisible gas, elastic; has a peculiar smell, burns in contact with Oxygen, yet by itself extinguishes flame, and is twelve times lighter than the atmospheric air.

Q. When Hydrogen unites with bodies, what are the compounds called?

A. Sulphurated, phosphorated, and carbonated Hydrogen, &c. &c.

Q. What is Nitrogen?

A. An invisible, elastic Gas, and by itself exceedingly irresperable, yet mechanically combined with Oxygen, it constitutes part of the atmospheric air; when chemically combined with a larger portion of Oxygen than that which constitutes the atmospheric air, it forms two Oxides and one Acid.

Q. Give an example?

A. In four parts of atmospheric air there is but one of Oxygen and three of Nitrogen. Nitrous Oxide contains a larger portion of Oxygen, Nitrous Oxide a still greater, and Nitric Acid, the result of Nitrogen, being fully saturated with Oxygen.

Q. What is the difference between oxidized and oxygenized.

A. When a substance is converted into an Oxide, we say it is oxidized, but when a substance is changed into an acid, we say it is oxygenized.

Kali e Tartaro.

Q. Why is the supertartrate of Potash reddened?

A. To expell the excess of Tartaric Acid.

Q. In what form is the excess of Tartaric Acid expelled?

A. In the form of Pyrotartarous Acid Gas, Carbonated Hydrogen Gas, and Carbonic Acid Gas, these are the vapours which are first emitted.

Q. What degree of heat is meant by a red heat?

A. From 800 to 900.

Q. After it ceases to exhale vapours, what remains in the crucible ?

A. Tartrate of Pot-ash, and a little Tartrate of Lime.

Q. What is now to be done with this Tartrate of Pot-ash ?

A. Roast it for two hours in the same silver crucible, without being covered, and keep it constantly stirred.

Q. Why is it roasted for two hours ?

A. To decompose the remaining Tartaric Acid.

Q. What are radicals of Tartaric Acid, when decomposed ?

A. Oxygen, Hydrogen, and Carbon.

Q. What becomes of those Gases ?

A. The Oxygen and Carbon unite to form Carbonic Acid, which unites with the Pot-ash in the crucible, while the Hydrogen is expelled.

Q. Why is it kept stirred ?

A. To hinder it from consolidating in the crucible, and to expose a larger surface for the absorbsion of Carbonic Acid.

Q. What is done next ?

A. Boil it for quarter of an hour, in twice its weight of water, and when the grosser particles have subsided, pour off the clear liquid; this is to be thrice repeated.

Q. Why is it boiled in three portions of water?

A. Because the subcarbonate of Pot-ash is more soluble in water than the impurities with which it is now combined, and the water being added in small quantities, becomes saturated before the others are dissolved, hence these extraneous Salts remain either on the filter or in the crucible, from which the pure liquid has been decanted.

Q. What are those impurities which remain behind?

A. Tartrate of lime, and carbonaceous matter.

Q. How is it granulated?

A. By stirring while evaporating.

Q. Why is it brought to a dull white heat after all the previous roasting and boiling?

A. To destroy its colouring matter.

Q. What degree of heat is a white heat?

A. From 900 to a 1000.

Q. Why is it preserved in closed bottles?

A. Because it is a deliquescent salt.

Q. What do you mean by deliquescence?

A. When a salt becomes moist or liquid by attracting water from the atmospheric air, it is said to deliquesce.

Q. Why does this salt deliquesce?

A. Because it is dryer than the surrounding air.

Q. After all this process, what is obtained?

A. A subcarbonate of Pot-ash.

Q. What is understood by a subcarbonate?

A. When there is not a sufficiency of Carbonic Acid to saturate the base, it is then called a subcarbonate.

Q. What are the impurities of Pot-ash?

A. Muriate of Pot-ash, Sulphate of Pot-ash, Oxide of Iron, Oxide of Manganese, Soda, Silica, Argilla, and Caustic Pot-ash.

Q. How are those impurities got rid of?

A. Some of them are not soluble in a small quantity of water; hence there is an advantage taken of this, as mentioned above.

Q. Is there any other method for obtaining subcarbonate of Pot-ash than that mentioned above?

A. Yes, it may be obtained from the Pot-ashes of Commerce.

Q. Why are these Pot-ashes of Commerce exposed in an open vessel to the action of the air for a week?

A. The vessel is open that they may attract Carbonic Acid from the atmosphere, and when this Acid unites with the Pot-ash, the Silica is deposited.

Q. Why is the Silica deposited?

A. Because the Pot-ash looses its causticity, and is rendered incapable of holding the Silica in solution by the Carbonic Acid.

Q. What is Pot-ash itself?

A. One of the fixed Alkalies, now known to be a metallic Oxide.

Q. What is the meaning of the word Alkali?

A. This word is of an Arabian origin, and signifies the dregs of bitterness.

Q. What are the radicals of Pot-ash?

A. Oxygen, combined with a metal called Potassium.

Q. How is an Alkali characterized?

A. It has a peculiar urinous and acrid taste; it turns vegetable blues green, and will change yellow to brown.

Q. What effect has it on Litmus?

A. None; unless the Litmus has been previously reddened in an acid, then the Alkali will restore the original blue colour of the Litmus.

Q. How does it restore the lost colour to the Litmus?

A. By saturating and neutralizing the Acid which robbed the Litmus of its colour?

Q. What effect have Alkalies on Turmeric Paper?

A. They turn it brown.

Q. What sort of an Alkali is Pot-ash?

A. I have said that it is called a Fixed Alkali; and it is also called a Vegetable Alkali.

Q. Why called Fixed, and why Vegetable?

A. It is called Fixed, because it cannot be volatilized without intense heat, and Vegetable, because obtained from burnt Plants.

Aqua Subcarbonat: Kali;

Q. What was this formerly called?

A. Oil of Tartar by deliquescence.

Q. Why is it put into an open glass funnel?

A. That it may attract moisture from the air.

Aqua Kali Caustici.

Q. Why is newly-burned Lime preferred?

A. Because it contains no Carbonic Acid.

Q. When water is poured on the Lime, what takes place?

A. The water is absorbed with a hissing noise, a large volume of Caloric is given out, the Lime crackles, and falls to powder.

Q. What is the cause of this Caloric?

A. The Water is now becoming solidified with the Lime, and we have seen that bodies, on becoming more dense, give out part of their Caloric.

Q. Why is the vessel covered?

A. To hinder the Lime from attracting Carbonic Acid from the air.

Q. What chemical changes take place on mixing the subcarbonate of Pot-ash with the Lime?

A. The Carbonic Acid quits the Pot-ash to unite with the Lime, which renders it insoluble in water, and the Pot-ash passes through the filter.

Q. How is it known to be well prepared?

A. By its not effervescing with Acids, not having colour or smell, and by not turning muddy with spt: vini.

Q. Why are green glass bottles preferred?

A. Because the Caustic Pot-ash does not act on Green Glass.

Q. What is White Glass composed of?

A. Of Soda and Silica.

Q. What imparts the different colours to Glass?

A. The different metallic Oxides; which hinder the Pot-ash from acting on the Silica of the Glass.

Q. What is the specific gravity of this liquor?

A. 1100 to 1000.

Q. What do you understand by Specific Gravity?

A. I mean the weight of a given measure of any solid or fluid, when compared with the weight of the same measure of distilled water

Kali Causticum

Q. What do you mean by Caustic Kali ?

A. I mean that Alkali which burns.

Q. How does it act so as to burn ?

A. It combines with the animal substance forming Soap, and it may be said to act by the laws of affinity.

Q. What was it formerly called ?

A. Infernal stone, or a stone of hell.

Q. Why is it kept in well-corked bottles ?

A. To hinder it from absorbing Carbonic Acid.

Q. What effect would Carbonic Acid have on it ?

A. Hinder it from being caustic.

Q. What are the signs of its goodness ?

A. It should be perfectly soluble in spirits of wine, and should not effervesce with acids.

Q. If it was not soluble in spirits of wine, what would you conclude ?

A. That it contained subcarbonate of Pot-ash, which is not soluble in spirits of wine.

Kali Causticum c Calce.

Q. What is the use of the Lime, in this preparation ?

A. To make it more mild and less deliquescent.

Subcarbonas Sodæ.

Q. Why do you boil the Soda in small portions of water ?

A. To separate it from its impurities.

Q. What impurities does Soda contain ?

A. Sulphate of Soda, Muriate of Soda, Caustic of Soda, Subcarbonate of Soda, Magnesia, Oxide of Iron, Oxide of Manganese, Argilla, and Silica.

Q. What substances remain in the vessel after boiling it ?

A. Oxide of Iron, Oxide of Manganese, Charcoal and Magnesia.

Q. What passes through the filter ?

A. A Sulphate of Soda, Muriate of Soda, Subcarbonate of Soda, Caustic Soda, and Silica.]

Q. How are those impurities got shut of?

A. By evaporating the lies to dryness, then dissolving the salt in boiling water, and letting it rest till crystals are formed.

Q. What becomes of the impurities ?

A. They remain in solution in the mother water and the subcarbonate of Soda crystalizes.

Q. Why are the lies evaporated from an open vessel ?

A. To attract Carbonic Acid from the Air, which acid unites with the Caustic Soda, and precipitates the Silica.

Q. Why must you take care not to increase the heat so as to melt again the salt.

A. Because the Carbonic Acid would be expelled.

Subcarb. Sodæ Exsiccatum.

Q. What is the best way to make this salt ?

A. By evaporating its water of crystallization in the sun.

Q. How would you set about doing it?

A. First powder it in the mortar, then expose it to the heat of the sun.

Q. What is Soda?

A. It is one of the fixed, and also called Mineral Alkalies.

Q. How obtained?

A. By lixiviting the ashes of marine plants, particularly the herb called Salsola Kali

Q. How would a solution of Soda be known from a solution of Pot-ash?

A. Nitro Muriate of Platina will precipitate the Pot-ash from its solution, but not the Soda.

Q. What are the radicals of Soda?

A. Oxygen and the Metal Sodium.

Q. What does the word radical signify in chemistry?

A. The simple, constituent parts of bodies, which are incapable of decomposition.

Aq: Ammon: Causticæ.

Q. Why is the vessel covered after the water is put on?

A. To hinder the absorbsion of Carbonic Acid.

Q. What takes place in this preparation?

A. The Muriatic Acid of the Muriate of Ammonia unites with the Lime, and form Muriate of Lime; the Ammonia being set free, the heat rises it in the form of Gas, which coming in contact with the vapour of the water, (also raised by the heat,) they unite, and are condensed by the abstraction of the Caloric, by means of the cold receiver into which they are distilled.

Q. What is the specific gravity of this liquor?

A. 936 to 1000 of distilled water.

Q. What is Ammonia?

A. The Volatile Alkali, and also called the Animal Alkali.

Q. Why called Volatile, and why Animal?

A. Because it requires only the temperature of the atmosphere to change its state of aggregation; and called Animal Alkali, because it is produced from the decomposition of animal substance.

Q. Is it obtained any other way?

A. Yes, it exists in soot, in combination with an acid; it is obtained from the distillation of hartshorn or bones, but is generally obtained from the Sal Ammoniac of commerce.

Q. What are the radicals of Ammonia?

A. Hydrogen and Nitrogen; but Sir H. Davy has made it appear to be a compound of Oxygen and a metal Ammonium.

Q. How does Ammonia exist in its pure state?

A. In the form of Gas.

Q. How does it happen that two Gases form a solid?

A. By the abstraction of Caloric.

Subcarb: Ammoni.

Q. What takes place in this preparation.

A. The Muriatic Acid of the Muriate of Ammonia unites with the Soda, and form Muriate of Soda; then the Carbonic Acid, set free from the Soda, rises in the state of Gas, as also does the Ammonia; the Gases then unite and form a Subcarbonate of Ammonia, the heat being abstracted, and the Gases having greater affinity for each other, than for heat.

Q. Why do you increase the heat gradually ?

A. Because the Ammonia would be sublimed without the Carbonic Acid, if the heat was sudden.

Q. How do you know that this is a Subcarbonate and not a Carbonate ?

A. A perfect Carbonate of Ammonia has no smell.

Q. Why has the Subcarbonate a smell ?

A. On account of the excess of Ammonia evaporating, and there not being a sufficient quantity of acid to make the Alkali more fixed.

Q. Why is there an excess of Lime used in making Aqua Ammoniæ Causticæ ?

A. Lest it should attract Carbonic Acid from the air.

Q. If Ammoniacal Gas be decomposed by Oxygen Gas assisted by heat, what is the result ?

A. Nitrous Acid and Water.

Q. What action has Ammonia on the Oxides of the Metals ?

A. It reduces some, and dissolves others.

Q. How does it accomplish this ?

A. Ammonia being admitted to consist of Hydrogen and Nitrogen, the Hydrogen seizes the Oxygen from the Metal, and forms water, while the Nitrogen escapes in a Gaseous form, leaving the Metal in its metallic state; some Metals are oxidized by Liquid Ammonia, and then dissolved.

Aqua Subcarbonatis Ammoniæ.

Q. How do you know that this is a Subcarbonate in solution, and not a Carbonate ?

A. Because it has a smell.—☞ See p. 18.

Q. Account for the changes in this liquor ?

A. They are the same as in the Subcarbonate, with this exception, that one is solid, and the other liquid.

Q. What is the specific gravity of this liquor ?

A. As 1095 to 1000.

Q. What effect has Ammoniacal Gas on water ?

A. Ammoniacal Gas being the lightest of all Gases, next Hydrogen, it renders it specifically lighter.

Q. If that be true, how comes it, that in this last preparation, the water is increased from 1000 to 1095 ?

A. This is owing to the Carbonic Acid which is condensed in the water with the Ammonia Liquor Volatilis Cornu Cervini.

Q. How does it happen, that from a solid horn, or bone, an Oil, a Liquor, and a Salt, can be obtained ?

A. By the agency of heat decomposing the animal substance ; the constituents of which are Oxygen, Hydrogen, Nitrogen, and Carbon.

Q. What arrangements do these elements take to produce the above-named substances, viz.—the Liquor, Salt, and Oil ?

A. Part of the Oxygen and part of the Hydrogen unite to form the Liquor ; another portion of the Hydrogen, and part of the Nitrogen, unite to form the Ammonia; another part of the Oxygen unites with part of the Carbon to form Carbonic Acid, which Carbonic Acid unites with the Ammonia to form Subcarbonate of Ammonia; then the remaining portions of the Oxygen, Hydrogen, Nitrogen, and Carbon, unite to form the Oil.

Q. What is the use of the Charcoal?

A. It unites with the Oil which passes through the filter, renders it more thick, and consequently not so apt to pass the filter; it also takes away the empyreumatic taste from the Liquor, and makes it clearer.

Q. How is Spirits of Hartshorn known to be good?

A. The larger the quantity of white coagulum is, when mixed with Spirits of Wine, the better it is.

Q. How would you know Spirits of Hartshorn from a solution of Subcarbonate of Ammonia?

A. By mixing the liquors with distilled water, that which turns white is the Spirit of Hartshorn.

Q. Why does it turn white more than the water of Subcarbonate of Ammonia?

A. Because Spirits of Hartshorn contains an empyreumatic Oil, which the other does not, and the Oil not being soluble turns the water white.

Q. How is Spirits of Hartshorn known from the water of Caustic Ammonia?

A. By its effervescing with acids, and by its throwing down a precipitate with Spirits of Wine, which the water of Caustic Ammonia will not do.

Acids.

Q. What is an Acid ?

A. In the language of Chemists, all substances, whether solid or fluid, which produce that sensation on our tongue, which we call sour, are Acids; besides they change all the vegetable blues green, and purple colours red, except indigo; and also combine with Earths, Alkalies, and Metallic Oxides, so as to form Salts.

Q. What is Sulphuric Acid?

A. It is the result from the saturation of Sulphur with Oxygen.

Q. How obtained ?

A. By burning Sulphur in leaden chambers, with about one-eighth or one-tenth of its weight of Nitre.

Q. Describe the chamber and the process ?

A. The chamber is square, having a small door near the top of one side; within there is placed a trough upon a stand, and in the bottom of the chamber is some water; the Sulphur mixed with the Nitrate of Pot-ash, is put into this trough, and set on fire; the Sulphur continues to burn from the Oxygen, afforded partly by the Nitre, but principally by the atmospheric air, the Oxygen being taken from the Nitric Acid which existed in the Nitrate of Pot-ash, the Sulphur attracting it, and from this partial decomposition of the Nitric Acid, Nitric Oxide Gas is disengaged and diffused through the chamber; it acts on the Sulphureous Acid Gas, formed in the combustion of the Sulphur, communicates to it Oxygen, and thus converts it into Sulphuric Acid, which is condensed in the water at the bottom of the chamber.

Q. How do you get rid of the water?

A. The water is distilled off the acid.

Q. What are the radicals of Sulphuric Acid?

A. Oygen and Sulphur.

Q. When two acids have the same radicals, but different proportions of Oxygen, how are they distinguished?

A. The termination of that which has most Oxygen is in "ic," the other in "ous;" thus Sulphurous and Sulphuric Acid.

Q. What does an Acid consist of?

A. It consists of a base or bases, combined with Oxygen; the base called the acidifiable principle, and the Oxygen the acidifying principle; but Sir H. Davy has discovered that Hydrogen, and also Chlorine produces Acids.

Q. What kind of an acid is Sulphuric Acid?

A. A Mineral Acid.

Acidum Sulph: Dilutum.

Q. Why is the acid mixed slowly with the water?

A. The heat evolved would crack the glass if mixed otherwise.

Q. How does heat crack glass?

A. By the sudden and unequal expansion of its parts.

Q. Why wait till the mixture is cold, and what is the pure liquor decanted from?

A. That the Sulphate of Pot-ash and the Sulphate of Lead might fall down when the mixture cools, these impurities not being so soluble in the cold, as in the mixture while hot.

Q. What advantage has the diluted acid over the concentrated acid?

A. It is more pure on account of the acid being weakened, and consequently not able to hold the Lead or the Pot-ash in solution.

Acid: Nitricum.

Q. What takes place in this preparation?

A. The Sulphuric Acid unites with Pot-ash of the Nitrate, and form Supersulphate of Pot-ash, while the Nitric Acid is disengaged, and passes over.

Q. What are the radicals of Nitric Acid?

A. Oxygen and Nitrogen.

Q. How is Nitric Acid known to be adulterated with Sulphuric or Muriatic Acids?

A. Dilute the suspected Nitric Acid with distilled water, and add to it a solution of the Muriate of Barytes; if Sulphuric Acid be present, there will be formed an insoluble Sulphate of Barytes; Muriatic Acid may be detected by adding to the diluted Nitric Acid a little of the Nitrate of Silver; if Muriatic Acid be present, the Silver will be precipitated white and insoluble.

Q. What are the characteristics of Nitric Acid?

A. It has the property of staining the skin permanently yellow; has a great affinity for water; is capable of oxidizing most of the metals, and with various bases form these salts called Nitrates.

Q. Why is there an excess of Sulphuric Acid used in the distillation of Nitric Acid?

A. To disengage all the Nitric Acid.

Q. What is the difference between Nitrous and Nitric Acids?

A. Nitrous Acid is the union of Oxygen and Nitrogen, in such proportions, that the Nitrogen is not saturated with Oxygen; whereas Nitric Acid is the result of a full saturation of Nitrogen with Oxygen.

Q. How is Nitrous Acid known from Nitric Acid?

A. Nitric Acid is quite transparent, but Nitrous Acid is generally of an orange yellow colour, which, upon the addition of small quantities of water, will change to different colours, while the vapours which rise preserve their original flame-coloured red appearance.

Acidum Muriatum.

Q. What Chemical changes take place in this preparation?

A. The Sulphuric Acid unites with the Soda of the Muriate of Soda, forming a Supersulphate of Soda, while Muriatic Acid, being set free, distils over.

Q. Why is the Muriate of Soda dried when it must be wetted immediately after?

A. To destroy the colouring matter.

Q. What is the cause of the dark colour which Muriatic Acid sometimes has?

A. It is occasioned by distilling it from an iron Still.

Q. How is Iron detected in Muriatic Acid?

A. Dilute it well with distilled water, then add a little of the Infusion of Galls, and if it turns black, iron is present.

Q. What preparation of Iron does it contain, and what is formed with the infusion of Galls?

A. It contains Muriate of Iron, which quits the Muriatic Acid to unite with the Tanmin and Gallic Acid of the Galls forming ink, or Tanno, Gallate of iron.

Q. Why is Distilled Water preferred?

A. Because common water generally contains lime or some other salts, consequently whatever acid would be diluted with common water would form Sulphate, Nitrate, or Muriate of Lime, according to the acid made use of; hence all acids should be diluted with distilled water.

Aqua Alkalina Oxymuriatica

Q. What takes place in this preparation?

A. The radicals of Muriate of Soda when dried are Chlorine, and the Metal Sodium; so that when you mix the Chlorine of Sodium and Oxide of Manganese, they are only mechanically combined; but when the Sulphuric Acid is poured on, the Oxygen of the Manganese is given out, part of which unites with the Sodium, and forms Soda; with which Soda the Sulphuric Acid combines, forming Sulphate of Soda; then the remaining part of the Oxygen of the Manganese decomposes the Muriatic Acid, absorbs its Hydrogen, and forms water; the Chlorine Gas being thus set free, passes over in its gaseous state, where it unites itself to the Kali, (expelling, at the same time, the Carbonic Acid) to form Oxymuriate of Pot-ash, or, as it is now called, Chlorate of Pot-ash.

Q. What is Chlorine?

A. It is now considered to be a simple substance, it not being decomposed, either by electricity or galvanism; and instead of calling it an Acid, it would be more proper to consider it an acidifying principle.

Q. How does it act on vegetable colours?

A. It destroys them.

Q. What remains in the matras after the distillation of the Aqua Alkalani Oxymuriatica?

A. A Sulphate of Soda and Sulphate of Manganese.

Q. How do you know that it is the Manganese and not the Sulphuric Acid, which gives Oxygen to the Sodium in the above preparation?

A. Because the Peroxide of Manganese is incapable of combining with Sulphuric Acid till it parts with some Oxygen, and becomes a Protoxide.

Aqua Oxymuriatica.

Q. What is the nature of this preparation?

A. Chlorine Gas condensed in water.

Q. Why do you use distilled water?

A. Common water contains Lime, and there would be a Chlorate of Lime formed.

Acidum Benzoicum.

Q. What is the rationale of this preparation?

A. The Acid being volatile, is sublimed by heat.

Q. How does it become adulterated with Oil ?

A. The resinous part of the Benzoin is decomposed, its Oxygen being driven off by the heat, and the essential Oil which was rendered concrete by the Oxygen, now becomes fluid again.

Q. What is Benzoin itself ?

A. It is a Balsam.

Q. What constitutes a Balsam ?

A. Benzoic Acid, a resin and an essential Oil.

Q. What is a resin ?

A. An essential Oil, rendered concrete by Oxygen.

Acidum Succinum.

Q. What use has the sand in this preparation ?

A. To hinder the amber from swelling too much, and to keep it from condensing into a mass.

Q. When combined with Ammonia, what is its use ?

A. It becomes a valuable re-agent in separating Iron from its solutions, and does not act on other metals.

Q. What is amber ?

A. It is a bitumenous substance, dug out of the ground.

Acetum Distillatum.

Q. Why is there only a moderate heat used ?

A. Lest the Acetus Acid would be decomposed and converted into Carbonic Acid.

Q. Why is there only 6lbs. out of 10lbs. distilled over ?

A. Because after 6 lbs. are distilled, the remainder becomes so loaded with extractive matter, that the heat required to keep up its ebulition would be so great, as to give the liquor acquired an empyreumatic odour and taste.

Q. Why is the first pound rejected?

A. It is all nearly water, with a little alcohol.

Q. How is Vinegar obtained or generated?

A. It is the product of acetus fermentation, prepared from different materials.

Q. Name some of those materials?

A. It is obtained from weak or sour wine, from unrefined sugar, and from the infusion of malted grain, the fermentation being excited by yeast.

Q. What is meant by fermentation?

A. The spontaneous change of vegetable substances, by which their properties are altered.

Q. What ingredients are necessary for fermentation?

A. Water, Sugar, and Mucilage.

Q. Under what circumstances will these ferment?

A. They require a degree of fluidity, a degree of heat from 60 to 80, and the free access of the air.

Q. How many kinds of fermentation?

A. Three; the Spiritous, the Acetus, and the Putrefactive; but Dr. Thompson added two more, the Panary, and the Saccharine fermentations.

Q. What is the result of each?

A. The Spiritous generates ardent Spirits, Wines, and Beers; the Acetus produces Vinegar, and from the Putrefactive, results Ammonia.

Q. What does the Vinegar of Commerce contain?

A. It contains pure Acetus Acid, Tartaric Acid, Malic Acid, Sugar, Mucilage, Tartrate of Pot-ash, Gluten and Extractive matter, from which it derives its colour.

Q. What colour should Vinegar be of?

A. Vinegar, when well fermented, should be of a limpid yellow reddish colour, having an agreeable odour, somewhat pungent, and a sour, but not disagreeable taste.

Q. Describe distilled Vinegar?

A. It should be colourless; its odour fainter, and less pleasing than common Vinegar; its taste less sour, and its acid powers weaker; it is purer, and not so liable to decomposition, as the Vinegar of Commerce.

Q. What is Vinegar generally adulterated with?

A. With Sulphuric and Muriatic Acids, and also with Copper.

Q. How detect those adulterations?

A. Sulphuric Acid may be discovered by adding a little of the solution of Muriate of Barytes, an insoluble Sulphate of Barytes will be formed; if a solution of Nitrate of Silver be added, and is precipitated, Muriatic Acid is present; add to the Vinegar a little Water of Caustic Ammonia, and if Copper be the impurity, the liquor will become blue; and also by passing a stream of Sulphurated Hydrogen Gas through the Vinegar, by means of a tube, Lead will be precipitated black.

Q. What is the best method to preserve Vinegar?

A. By heating it, and even boiling it in a covered glass vessel for some minutes.

Acidum Aceticum.

Q. What takes place in this preparation?

A. The Sulphuric Acid unites with the Kali of the Acetate of Kali, and forms Sulphat of Kali; then the Acetic Acid is distilled over on being set free.

Q. What is the difference between Acetus and Acetic Acid?

A. Acetic Acid is more concentrated than Acetus Acid.

Q. What is the cause of Caloric being given out?

A. The water in the crystals of the Acetate is becoming more dense, being acted on by the Sulphuric Acid.

Q. Why wait after each addition till it cools?

A. Lest the heat evolved would decompose the Acetic Acid.

Sulphas Kali.

Q. What Salt remains after the distillation of Nitric Acid?

A. A Supersulphat of Pot-ash.

Q. Why filter while the Liquor is hot?

A. Because the greater part of the Sulphat of Potass could not pass through it, not being so soluble in cold water.

Q. When the excess of Acid is saturated, what kind of Salt have you?

A. A Neutral Salt.

Q. What is meant by Neutral Salt?

A. A Salt in which neither the Acid or the Alkali predominates.

Q. How is a Neutral Salt known ?

A. By its not changing the colour of Litmus or Turmeric Paper.

Q. If a Salt restores the blue colour to Litmus which had been reddened in an Acid, what will you conclude ?

A. That the Alkali prevails.

Q. But how do you try them with Litmus ?

A. Make a solution of the Salt in water, then dip the Litmus Paper into it.

Sulphus Sodae.

Q. What Salt remains after the distillation of Muriatic Acid ?

A. Supersulphat of Soda.

Q. What becomes of the excess of Sulphuric Acid ?

A. It combines with the water.

Q. Why is it slowly cooled ?

A. To admit of the regular and determinate arrangements of the crystals.

Q. What is the transparency of crystals owing to ?

A. To their water of crystalization.

Q. What kind of a Salt is Sulphas Soda ?

A. A Neutral Salt.

Q. How is that ascertained ?

A. By the test of Litmus. See Sulphas Kali.

Murias Sodæ Siccatum.

Q. Why is it dried ?

A. To destroy its colouring matter.

Q. What is the difference between Muriate of Soda before it is dried and after?

A. Before it is dried, it consists of Muriatic Acid and Soda, after it is dried it consists of Chlorine and the Metal Sodium.

Acetas Kali, vel sal Diureticus.

Q. What takes place in this preparation?

A. The Carbonic Acid is expelled, the Acetus Acid unites with the Kali, and forms Acetate of Kali.

Q. Why is it cautiously melted on a gradually increased heat?

A. Lest the Acetic Acid would be decomposed and expelled.

Q. Why should it be kept in well stopped bottles?

A. Because it is a deliquescent salt.

Aqua Acetatis Ammoniæ.

Q. What takes place in this preparation?

A. The Carbonic Acid is expelled, which causes the effervescence in escaping.

Q. How know when it is saturated?

A. Take two pieces of Litmus, one reddened in acid, the other not; if it restores the original blue to that which was red, the Alkali is in excess; if it reddens the blue Litmus the acid prevails; but if it has no action on either the saturation is complete.

Tartaras Kali.

Q. What takes place in this preparation?

A. The Carbonic Acid is expelled, and the excess of Tartaric Acid in the crystals of Tartar, unites with the Potash, and forms Tartrate of Potash, a Seutral Nalt.

Q. Why is it filtered?

A. To take away any Tartrate of Lime that might have been in the Supertartrate of Potash.

Tartaras Sodae et Kali.

Q. What kind of a Salt is this?

A. A Tripple Neutral Salt, consisting of Tartaric Acid, saturated with Soda and Pot-ash.

Q. What takes place during its formation?

A. The Carbonic Acid is expelled from the Carbonate of Soda, which Soda unites with the excess of the Tartaric Acid in the Supertartrate of Potash, forming a Tartrate of Soda and Potass.

Q. How would a solution of Glauber be known from a solution of Rochelle Salts?

A. Muriate of Barytes will be precipitated by all the Salts which have Sulphuric Acid in combination, besides the Pot-ash in the Rochelle Salts, will precipitate Nitro Muriate of Platinum, which the Soda in the Glauber Salts will not.

Phosphas Sodae.

Q. What is the theory of this compound?

A. When the bones are burned you obtain a

Phosphate of Lime, when the Sulphuric Acid is added, it unites with part of the Lime, forming a Sulphat of lime, that portion of the Phosporic Acid, which was dispossessed by the Sulphuric Acid, uniting itself to the remaining part of the undecomposed Phosphate of Lime forms a Super-Phosphate of Lime, then the unsoluble Sulphate of Lime falls down, involving in its mass the greater part of the Superphosphate; then on the addition of a large quantity of water, all the Superphosphate of Lime is washed through the strainer leaving the Sulphate behind; and lastly, when this Superphosphate of Lime, which is now in solution, is mixed with the Subcarbonate of Soda, the excess of Phosphoric Acid unites with the Soda, forming Phosphate of Soda, the Carbonic Acid is expelled, and the Phosphate of Lime precipitated.

Q. Why are the bones burned?

A. To dissipate the gelatin, the oil, and the other substances of the bone.

Q. How does this take place?

A. Animal substance consisting of Oxygen, Hydrogen, Nitrogen and Carbon, part of the Oxygen unites with part of the Hydrogen to form water, this is driven off in vapour; part of the Hydrogen and Nitrogen unites to form Ammonia, this is expelled in the form of Ammoniacal Gas; the remaining Oxygen unites with the Carbon, and is expelled in the form of Carbonic Acid Gas.

Q. What remains on the filter after the first filtration?

A. Sulphat of Lime, not being soluble in the water.

Q. Why is it evaporated to one-half?

A. Lest so large a quantity of water might hold some of the Sulphat of Lime in solution.

Q. What remains on the filter the second time?

A. Phosphate of Lime.

Q. What is Phosphorus?

A. An inflammable semi-transparent substance, burns at a low temperature in contact with Oxygen Gas, or Atmospheric Air, and when saturated with Oxygen, forms Phosphoric Acid.

Q. What kind of Acid is Phosphoric Acid?

A. It has both an animal and mineral origin.

Q. How is Phosphoric known from Phosphorus Acid?

A. Phosphorus Acid emits the smell of Garlic when burned, which Phosphoric does not.

Q. How obtained?

A. It was formerly obtained from Urine, &c., but now from the decomposition of animal bones.

Q. When Phosphoric Acid unites with an Alkaline base, what is formed?

A. A Phosphate.

Q. When Phosphorus Acid is in combination, what is the result?

A. Phosphites.

Q. When Phosphorus itself combines with a combustible, what is the result?

A. Phosphurets.

Earthy Preparations.

Q. What is an Earth?

A. An incombustible substance, nearly insoluble in water, and of the specific gravity not exceeding 4.9; they were supposed to be simple substances, but now they are known to be Metallic Oxides.

Q. How are the Earths classed ?

A. Into Alkaline and Proper.

Q. How many Earths are known to Chemists ?

A. Nine, viz.—Magnesia, Lime, Barytes, Silex, Argil, Strontian, Zircon, Glucine, and Ytria.

Q. How many used in medicine?

A. Four—Magnesia, Lime, Alumina, and Barytes.

Q. Which are the proper Earths, and which the Alkaline ?

A. Alumina and Silica, the proper Earths; Magnesia, Lime, and Strontites, the Alkaline Earths.

Q. Why are they called Alkaline Earths ?

A. Because they resemble Alkalies in their taste, causticity, solubility in water, and turn vegetable colours green ; Magnesia, only, agrees with them in their action on vegetable colours.

Q. Are they ever found pure in nature ?

A. No, always combined with Acids.

Q. How is an Alkaline Earth known from an Alkaline Salt ?

A. By combining both with Carbonic Acid, the Alkali carbonated is soluble in water, but the Carbonated Earth is not.

Aqua Calcis.

Q. Why is newly-burned Lime used ?

A. Because it contains no Carbonic Acid.

Q. What would the consequence be if it did ?

A. It would not be soluble in water.

Q. Why is the vessel covered while the Lime is slacking ?

A. To hinder it from attracting Carbonic Acid from the air.

Q. What is the cause of the heat ?

A. The water is passing from a fluid to a solid state. ☞ See Caloric.

Q. Why is all the water not poured on at once ?

A. The Lime would be formed into a kind of paste, so that the water could not overcome its attraction of aggragation.

Q. How is it preserved ?

A. In closely-corked jars.

Q. Why are the jars closely corked ?

A. To hinder the Lime from attracting Carbonic Acid from the atmospheric air.

Q. What are the radicals of Lime ?

A. Oxygen, and the Metal Calcium.

Q. Describe the appearance of Lime-water when it has, or is attracting, Carbonic Acid ?

A. There is first a white pellicle formed on the surface of the water, until its specific gravity is increased beyond that of the water, then it falls to the bottom, giving way for a new pellicle to be formed, and thus it goes on till the water has no more pure Lime in solution.

Q. How much water will Quick Lime absorb ?

A. About one-third of its weight ; and yet will be still dry ; it is then called a Hydrate of Lime ; pure Lime is soluble in 200 parts of water.

Creta Præparata.

Q. What are the impurities that this operation is intended to separate the Chalk from?

A. Silica and Argilla.

Q. Why is there a little water added when grinding?

A. To hinder the finer particles from flying off.

Q. Why do the finer particles swim on water?

A. Because they are of the same specific gravity.

Q. If this be true, why do they fall to the bottom?

A. Because they are not soluble in water.

Ovorum Testæ Præparatæ.

Q. How does this differ from prepared Chalk?

A. It contains a little Phosphate of Lime.

Aqua Muriatis Calcis.

Q. What is the theory of this preparation?

A. The Muriatic Acid unites with the Chalk, expels its Carbonic Acid, and forms Muriate of Lime.

Q. Why is it filtered?

A. To separate the Argilla and Silica.

Creta Præcipitata.

Q. What is the theory of this preparation?

A. The Muriatic Acid unites with the Soda to form Muriate of Soda, and the Chalk is precipitated, because it unites with the Carbonic Acid of the Soda, and then becomes insoluble.

Q· How is precipitated known from prepared Chalk ?

A. Precipitated Chalk should make a perfectly clear solution in diluted Muriatic Acid, but the prepared will not.

Q. Which is ordered by the D. C. in all these preparations into which Chalk enters ?

A. The Precipitated Chalk.

Q. Why is it washed with such quantities of water ?

A. Lest it should contain Muriate of Soda.

Subcarbonas Magnesiae.

Q. What is the theory of this preparation ?

A. The Sulphuric Acid of the Sulphat of Magnesia combines with the Kali of the Subcarbonate of Kali, and forms a Sulphat of Kali; the Carbonic Acid unites with the Magnesia, and forms a Subcarbonate of Magnesia.

Q. Why is the liquor boiled for some time ?

A. To expel the excess of Carbonic Acid, which rendered part of the Magnesia soluble.

Q. Why is it strained while hot ?

A. Because part of the Sulphat of Kali would be catched on the filter, it not being so soluble in cold water as in hot.

Q. Why is it washed with hot water ?

A. Lest it should (as it generally does) contain any of the Sulphat of Pot-ash.

Q. How do you know that this is a Subcarbonate, and not a Supercarbonate of Magnesia ?

A. A Supercarbonate is soluble in water, but the Subcarbonate is not.

Q. Is there any other method to obtain Subcarbonate of Magnesia ?

A. Yes, by decomposing the bittern or the mother water, which remains after the crystallization of common salt from sea water.

Q. How is this done ?

A. By adding to the liquor some Subcarbonate of Soda, the decomposition takes place as mentioned above, except that there is a Muriate of Soda formed, which is a much more soluble salt than the Sulphat of Kali.

Q. How does Magnesia resemble the Alkalies ?

A. In possessing that property of turning the vegetable blues green.

Q. What are its radicals ?

A. Oxygen combined with the Metal Magnesium.

Magnesia Usta.

Q. Why is Magnesia calcined ?

A. To expel its Carbonic Acid.

Q. How is calcined Magnesia known from the Subcarbonate of Magnesia ?

A. By its not effervescing with acids.

Q. What is Magnesia generally adulterated with ?

A. With lime, flower, starch.

Q. How detect these ?

A. By diluted Sulphuric Acid the Magnesia will be dissolved, leaving the starch and flower behind, and it will form an insoluble Sulphat of Lime, if Lime be present.

Q. What is the proper name for Calcined Magnesia?

A. I think Hydrate of Magnesia.

Q. How much does it lose of its weight by burning?

A. 7-12ths.

Alumen Ustum.

Q. What takes place when roasted?

A. It first undergoes the watery fusion, and then the water is expelled.

Q. How many kinds of alum?

A. Three; the English, the Roman, and the Roach.

Q. Which is best and most generally used?

A. The Roman, which may be known by its effervescent appearance.

Q. What is the composition of Alum?

A. A Sulphuric Acid in excess, a lumina, a small quantity of Potass, and some times Ammonia.

Q. What is there peculiar to this Earth?

A. It contracts and becomes so hard by heat, that it will strike fire with steel.

Q. What substances afford this Earth?

A. It is the basis of common clay.

Q. Why is Pot-ash used in forming Alum?

A. Because the crystals would be very small, and would form with great difficulty.

Sulphur, Preparations of.

Q. What is Sulphur?

A. It is considered at present to be a simple substance, it not having been decomposed.

Q. How is Sulphur generally obtained?

A. It is found native about volcanoes; it is sublimed from the Sulphurous grounds in Italy, and is obtained from metalic ores, called Martial Pyrites.

Q. Is there any thing peculiar to Sulphur when melted in an open vessel?

A. Yes, it forms an exception to the general rule of Caloric making fusible bodies more fluid the higher the temperature, whereas Sulphur when heated above a certain point thickens, then being allowed to cool, it becomes nearly as thin as water, and below a certain heat it is solid again.

Q. If Sulphur be kept fused in Atmospheric Air, what happens?

A. It absorbs Oxygen in a small portion, and becomes an Oxide.

Q. But if it takes fire, what will be the result?

A. When consumed Sulphurous Acid.

Q. When Sulphur combines with other substances, what is formed?

A. Sulphurets.

Q. When Sulphurous Acid enters into combination, what is the result?

A. Sulphites are formed.

Q. If Sulphurets are mixed with water, what takes place?

A. The Alkaline and Earthy Sulphurets have the property of decomposing water; they absorb its Oxygen and are converted into Earthy or Alkaline Sulphates, and also into Hydro and Hydroguretted Sulphurets.

Q. What is the difference between an Hydro-Sulphuret and an Hydroguretted Sulphuret?

A. An Hydro Sulphuret consists of one part of Hydrogen, (and suppose we say,) fifteen of Sulphur; an Hydroguretted Sulphuret, consists of one portion of Hydrogen and 30 of Sulphur.

Q. What are the properties of these Hydro and Hydroguretted Sulphurets?

A. They are of the same nature of Acids, and possess the property of decomposing the metallic Oxides.

Sulphur Sublimatum.

Q. Why is Sulphur washed?

A. To take off the Sulphurous Acid, which it acquired during its sublimation.

Q. How is it known to be free from Acid?

A. By the water in which it is washed not reddening litmus.

Sulphuretum Kali.

Q. How is Sulphurete of Kali known?

A. By mixing a little of it with water there will be a most offensive smell from the Sulphuretted Hydrogen Gas escaping.—See above.

Q. What takes place in the preparation of Sulphurete of Kali?

A. The Carbonic Acid is expelled in its gaseous state, then the Sulphur and pure Pot-ash unite to form Sulphurete of Pot-ash.

Q. Why is a gradually-increased heat used?

A. To fuse the Sulphur without subliming it, that it may more easily unite with the Pot-ash, and lest the sudden extrication of the Gas should throw the Sulphur out of the crucible.

Q. Why is the vessel covered ?

A. To hinder it from catching fire.

Aqua Sulphureti Kali.

Q. What is the theory of this preparation ?

A. The water is decomposed ; its Oxygen unites with part of the Sulphur, and forms Sulphurous Acid, which unites with part of the Kali, and forms Sulphate of Kali ; part of the Hydrogen of the decomposed water unites with another portion of the Sulphur, and escapes in the form of Sulphurated Hydrogen Gas, whilst another part of the Hydrogen unites with two parts of Sulphur to form an Hydroguretted Sulphuret, which combines with the remaining part of the Potass, and forms an Hydroguretted Sulphuret of Pot-ash.

Q. Why is it filtered ?

A. To take away the Sulphate of Pot-ash.

Q. What have you then in solution ?

A. An Hydrosulphuret and an Hydroguretted Sulphuret of Potash.

Q. What is the use of combining Sulphur with Potass ?

A. Pot-ash renders one-third of its weight of Sulphur soluble in water.

Aqua Sulphureti Ammonæ.

Q. What is the theory of this preparation ?

A. The Muriatic Acid of the Muriate of Ammonia unites with part of the Lime, forming Muriate of Lime ; part of the water is decomposed into its radicals, viz.—Oxygen and Hydrogen; the Oxygen unites with part of the Sulphur, forming Sulphurous Acid, and this Acid combines with the remaining part of the Lime, forming Sulphite of Lime; then part of the Hydrogen unites with part of the Sulphur to form Hydrosulphuret, and this Hydrosulphuret passes over along with part of the Ammonia and undecomposed water into the receiver, where they are condensed; again, the remaining part of the Hydrogen of the water combines with two portions of Sulphur, forming an Hydroguretted Sulphuret; this Hydroguretted Sulphuret is presented to another part of the Ammonia, both in their gaseous state, they are distilled over with part of the undecomposed water, and are also condensed in the receiver.

Q. What have yon in the receiver?

A. A Sulphate of Lime and Muriate of Lime.

Q. What remains in the receiver?

A. Hydrosulphuret of Ammonia, and Hydroguretted Sulphuret of Ammonia, and also some uncombined Ammonia, which is constantly escaping; hence the old name, Fuming Liquor of Boyle.

Sulphuretum Ferri.

Q. What are the chemical changes of this preparation?

A. The changes are none; it consists of Sulphur and Iron, artificially or mechanically combined.

Hydrosulphureti Ammoniæ.

Q. What is the theory of this preparation?

A. The water is decomposed; its Oxygen unites with the Iron, formng a Protoxide of Iron, and this Protoxide decomposes the Muriatic Acid; the Oxygen of the iron combines with the Hydrogen of the Muriatic Acid, forming Water; then the Chlorine unites with the Iron forming a Chloride of Iron; next, the Hydrogen of the decomposed water unites with Sulphur of the Sulphuret to form Sulphuretted Hydrogen, which passes over into the receiver that contains the water of Ammonia, where it is then condensed by its union with the Ammonia.

Q. What appearance has Ammonia when combined with Sulphuretted Hydrogen?

A. A green-yellow colour.

Q. Why is the Acid added by degrees?

A. To prevent the sudden extrication of the Gas.

Metallic Preparations.

Q. What are Metals?

A. They are supposed to be simple substances, possessed of certain characteristic qualities.

Q. What are those qualities?

A. Hardness, tenacity, opacity, ductility, malleability, being capable of reflecting light, and of burning when heated to a certain temperature in contact with Oxygen Gas.

Q. What is the difference between ductility, tenacity, and malleability?

A. The term ductility is applied to that property in metals which admit of being drawn out into wires; malleability, by which they admit of being pressed or beat into plates; and tenacity, that power of cohesion, which enables them to undergo malleability and ductility.

Q. Are all Metals opake ?

A. Gold, when very thin, admits of a greenish light.

Q. What expands Metals ?

A. Caloric, which is supposed to introduce itself between the metallic particles, and causes them to assume greater distances.

Q. Do Metals differ in their fusibility ?

A. Yes; Mercury melts under a very low temperature, whereas Platinum requires the greatest heat.

Q. When a Metal combines with an Acid, what takes place ?

A. It decomposes either the water, or part of the acid; absorbs the Oxygen from the acid or water, is oxydized, and then is dissolved by the remaining acid.

Q. How are Metals classed ?

A. Into malleable and brittle.

Q. How many Metals are used in Medicine ?

A. We generally speak of ten, viz. :—Silver, Mercury, Copper, Iron, Tin, Lead, Zinc, Bismuth, Antimony, Arsenic.

Q. What is the difference between Metallic Oxides and Metallic Salts ?

A. Metallic Oxides consist of Oxygen combined with a Metal, and not having any Acid properties; a Metallic Salt is a Metallic Oxide combined with an Acid.

Sulphuretum Antimonii Pæparatum.

Q. What is the reason for this preparation?

A. To render the Antimony more active, and to reduce the Spiculæ to a fine powder lest they might irritate the stomach, by acting on it mechanically.

Q. How is Sulphuret of Antimony obtained?

A. It is found native in combination with Sulphur; it is also procured from an ore found in Sweden, Saxony, and Norway; it is known in those countries by the name of Ore of Antimony.

Q. How many Oxides of Antimony are we at present acquainted with?

A. The Protoxide, white; the Peroxide; yellow, and Deutoxide, grey-coloured.

Q. What are the combinations of Antimony?

A. Beside those we have been speaking of, it also combines with Chlorine, Iodine, Phosphorous, and also with Acids.

Pulvis Antimonialis.

Q. Why is the Hartshorn boiled?

A. To take away the Animal Gelatine.

Q. When it is dried, what remains?

A. Phosphate of Lime, and a little Carbonate of Lime.

Q. Describe what takes place in this preparation?

A. When the Sulphuret of Antimony and the Phosphate of Lime are thrown into an iron pot heated to a red heat, the Sulphur is driven off in the form of vapour, the Antimony is Oxidized, and then combines with the Phosphate of Lime.

Q. Are they chemically combined?

A. Some say they are, others that they are only mechanically together.

Q. What is it intended as a substitute for?

A. James's Powder.

Q. Why is the vessel left open?

A. That the Antimony may attract Oxygen from the air.

Q. Why is it brought to a white heat?

A. To expel all the Sulphur, and to decompose any of the animal substance which it might contain; and also lest there might be any of the Antimony which had not been Oxidized.

Q. In what degree of Oxidation is this?

A. Deutoxide.

Oxidum Antim: Nitromuriaticum.

Properly Submurias Antimonii.

Q. Describe the theory of this preparation?

A. The Nitric Acid is decomposed, part of its Oxygen unites with the Antimony, to form Protoxide of Antimony; another part of the Oxygen combines with the Sulphur of the Sulpheret, forming Sulphurous Acid, which Acid, and also some Nitrous Acid Gas, escapes in their gaseous state; then the Muriatic Acid dissolves the Protoxide of Antimony, forming a Muriatic of Antimony; or, according to Sir H. Davy, the Oxygen of the Metal seizes the Hydrogen of the Muriatic Acid, forming water, while the Chlorine of the decomposed Acid unites with the Metal, by which union it forms a Bichlorate of Antimony, when this Bichtorate is mixed with the water, part of that excess of Chlorine which rendered it soluble, is attracted by the water, and a Chlorate of Antimony precipitated.

Q. What remains in solution ?

A. A Supermuriate, or Bichlorate of Antimony.

Tartarum Antimoniatum.

Q. What are the chemical changes in this preparation ?

A. According to the old theory the Muriatic Acid or part of it unites with the Lime in the Supertartrate of Pot-ash, forming a Muriate of Lime; then another part of the Acid combines with part of the Pot-ash, forming a Muriate of Pot-ash, while the Oxide of Antimony unites itself to the excess of Tartaric Acid in the Supertartrate, to form a Triple Neutral Metallic Salt, consisting of Tartrate of Antimony and Pot-ash.

Q. Why is it filtered ?

A. To take away the Tartrate of Lime.

Q. What passes through the filter ?

A. The Muriate of Lime and Pot-ash, and also the Tart: Antim:

Q. How is the Muriate of Lime and Pot-ash got rid of ?

A. They remain in solution after the Tartarized Antimony has crystallized :

Q. Why do they remain in solution ?

A. Because they are deliquescent Salts.

Q. How is the goodness of Tartarized Antimony proved ?

A. By making a solution of it in distilled water, then adding a little of the water of Hydrosulphuret of Ammonia, the larger the quantity of precipitate the better the Tartar Emetic.

Q. What takes place when water of Hydro-Sulphuret of Ammonia is added to the solution of Tartar Emetic?

A. The Tartaric Acid of the Tartar Emetic, unites with the Ammonia in the Hydrosulphuret of Ammonia, forming a Tartrate of Ammonia, while the Hydrosulphuret combines with the Oxide of Antimony, forming a Hydrosulphuret of Antimony which is precipitated.

Sulphur Antimoniatum Fuscum.

Q. What is the theory of this preparation?

A. When the Sulphuret of Antimony, and Sub-carbonate of Pot-ash are fused together, the Carbonic Acid is expelled, leaving in the crucible a Sulphuret of Pot-ash and Antimony; when these are boiled in the water, the water is decomposed, part of its Oxygen unites with the Antimony, forming a Protoxide of Antimony, while another part of the Oxygen unites with part of the Sulphur, forming Sulphurous Acid, which combines with part of the Pot-ash to form Sulphite of Pot-ash; then part of the Hydrogen of the decomposed water unites with one portion of Sulphur, forming an Hydrosulphuret, which Hydrosulphuret combines with part of the Protoxide of Antimony, forming an Hydrosulphuret of Antimony, which is precipitated when the water cools. (This is what was called Kermes Mineral.) In boiling there also united another part of the Hydrogen of the water with two portions of Sulphur, forming an Hydroguretted Sulphuret, and this Hydroguretted Sulphuret, combined with the rest of the Protoxide of Antimony, forming an Hydroguretted Sulphuret of Antimony, (this is what is held in solution by the Pot-ash,) but now the Sulphuric Acid is aded, it seizes the Pot-ash, forms a Sulphat of it, and the Hydroguretted Sulphuret thus set at liberty is precipitated.

Q. What is done with the powders after that which was last obtained, has been washed until the decanted water no longer reddens Litmus?

A. They are to be well mixed together.

Q. How is it known that any Sulphite of Pot-ash has been formed in the first part of the process?

A. When we know that an Hydrosulphuret and an Hydroguretted Sulphuret are both equally soluble when combined with an excess of Pot-ash, it is evident that unless there had been a Sulphite of Pot-ash formed, there could have been no Kermes Mineral precipitated on the first cooling of the liquor, for both would have been kept in solution until the Sulphuric Acid would be added to saturate the Caustic Pot-ash, and this is the very thing we have seen above.

Q. From what is the liquor decanted the first time?

A. From the Sulphite of Pot-ash.

Q. Why is the Sulphuret of Antimony and Pot-ash pulverized after being fused together?

A. That the water may act on it more easily.

Q. Why is it boiled for quarter of an hour?

A. In order that the water may be decomposed to oxidize the metal, and to give Oxygen to the Sulphur to form Sulphurous Acid.

Q. What is decanted off the second time?

A. The Sulphat and Sulphite of Pot-ash, which are held in solution.

Q. Why is the Precipitate washed?

A. To take away any Sulphate of Pot-ash that might adhere to it.

Silver.

Q. How is Silver obtained?

A. It is found native in the Mines of Mexico, Peru; also in Ireland and Britain.

Q. How many degrees of oxidizement does silver admit of?

A. The grey or brown Oxide is the only one that is known with certainty; it consists of 100 of Silver, and 73 of Oxygen in 100 pts.

Q. What is the dark colour of Silver when exposed to the air owing to?

A. Sulphuretted Hydrogen.

Nitras Argenti.

Q. What is the theory of this preparation?

A. When the Silver is put into the diluted Nitrus Acid, part of the Acid is decomposed, its Oxygen unites with the Silver, forms a peroxide of Silver, which peroxide is afterwards dissolved in the remaining Nitrus Acid; when this is evaporated to dryness you have a Supernitrate of the Peroxide of of Silver; but in fusing it afterwards, in order to cast it into moulds, part of the Nitrus Acid is expelled, leaving a Subnitrate of the Peroxide behind.

Q. Why is Distilled Water used?

A. The Nitrus Acid would unite with the Lime, and form a Nitrate of Lime, and the Silver would be precipitated.

Q. Why is it preserved in closely-stopped bottles?

A. Because it is a deliquescent Salt.

Q. Why is it deliquescent?

A. Because it contains Nitrate of Copper.

Q. How did the Silver become adulterated with Copper?

A. The Silver which we generally make use of in our ornaments or current coin must be alloyed with Copper, without which it would not have sufficient hardness to wear for any time; hence it is that the Silver we generally make our Lunar Caustic of, must contain Copper.

Q. How free it from this Copper?

A. By dissolving the Nitrate of Silver in distilled water the Nitrate of Silver will crystallize, leaving the Nitrate of Copper in solution, and those are the crystals which are fit for internal use.

Preparations of Copper.

Q. How is Copper obtained?

A. It is found native in England and Wales, and many other parts of the world. The Copper pyrates are Sulphurets of Copper.

Q. How many Oxides of Copper?

A. Two—the Protoxide, red; and the Peroxide, black.

Ærugo Prpæarata.

Q. Why is Verdigris put through this process?

A. To deprive the Verdigris of any of the stalks of the Grape, or Earth, or Gypsum, which it might contain.

Q. How is Verdigris known to be perfectly pure ?

A. It should be soluble in Dilute Sulphuric Acid.

Q. What preparation of Verdigris does the Ærugo Præparata contain?

A. A Subacetate of Copper.

Aqua Cupri Ammoniati.

Q. What is the theory of this preparation ?

A. The Muriatic Acid of the Muriate of Ammonia unites with the Lime, forming a Muriate of Lime; the Acetic Acid of the per and subacetate of Copper unites with part of the Ammonia, forming an acetate of Ammonia, while the remaining unsaturated Ammonia dissolves the Oxide of Copper; so that there is in solution a Muriate of Lime, an Acetate of Ammonia, and an Oxide of Copper, held in solution by the Caustic Ammonia.

Q. From what is the pure liquor decanted ?

A. From those impurities which we have spoken of to be in Verdigris.

Q. How do those impurities happen to be in Verdigris ?

A. In the making of Verdigris, the grape stalks and husks are strewed on Copper plates; after the stalks have fermented, and become white, they are removed; when the plates are found to be covered with crystals of Copper, these plates are next put with their surfaces in contact, into a cellar; then they are to be dipped in water, and laid on their edges to dry. This process is to be repeated for seven or eight days, when the Copper will be found to be covered over with Verdigris.

Cuprum Ammoniatum.

Q. What is the theory of this preparation ?

A. The Carbonic Acid is expelled, and the Ammonia unites with the excess of Sulphuric Acid in the Supersulphat of Copper, forming a tripple neutral Metallic Salt, composed of Sulphat of Copper and Ammonia.

Q. Why is it wrapped in absorbent paper while drying ?

A. Because the light would decompose and reduce the Metal.

Q. Why do they become wet when ground together ?

A. The new compound formed, has not so great a capacity for water as they had when separate.

Q. When do they begin to act on each other ?

A. Not until they become wet.

Preparations of Iron.

Q. How is Iron obtained ?

A. It is found native in the earth, under a variety of forms, combined with Sulphur, Earths, and alloyed with other metals ; it exists in the waters of many springs ; it exists in vegetables ; gives colour to the blood, and to many vessls.

Q. How may Iron be known from other metals ?

A. It is attracted by the magnet, and has the property of becoming itself magnited ; it is also capable of striking fire in collision with a flint, and is the most elastic of all metals.

Q. How many Oxides of Iron ?

A. Two; the Protoxide, black; the Peroxide, red.

Ferri Rubigo.

Q. What preparation of Iron is the rust ?

A. A Supcarbonate of the Per and Protoxides.

Q. What takes place in the preparation of it ?

A. The water is decomposed; its Oxygen unites with part of the Iron, and forms a Peroxide; then the Hydrogen of the decomposed water is driven off; another part of the Iron is oxidized by the atmosphere, and forms a Protoxide of Iron, which being black, and the Peroxide red, forms the brown colour.

Q. How does it come to be combined with Carbonic Acid.

A. It is attracted from the atmosphere.

Q. Why is the Iron Wire exposed to the air ?

A. To attract Oxygen.

Sulphas Ferri.

Q. What is the theory of this preparation ?

A. Part of water is decomposed, its Oxygen unites with the Iron, forming a Protoxide of Iron, the Hydrogen escapes in its gaseous state, and the Protoxide of Iron is dissolved by the Sulphuric Acid, forming a Sulphat of the Protoxide of Iron, which crystalizes.

Q. Why is it green ?

A. Because it is the Protoxide of Iron.

Q. Why is the liquor filtered ?

A. Lest it might contain any Carbon or Charcoal.

Sulphas Ferri Exsicatum.

Q. What takes place in this preparation ?

A. The water of crystalization is expelled, and the Iron attracts as much Oxygen from the air, as changes it from a Protoxide to a Peroxide.

Q. Why would not a glazed vessel answer in making this preparation ?

A. Because the Sulphuric Acid would act on the lead (which is used in the glazing of vessels), and form a Sulphat of Lead.

Q. What heat is used ?

A. A heat of 212 degrees.

Oxidum Ferri Rubrum

Q. What takes place in this preparation ?

A. The Sulphurous Acid is decomposed ; its Oxygen unites with the Protoxide, forming a Peroxide of Iron and Sulphurous Acid Gas escapes.

Subcarbonas Ferri.

Q. Account for the chemical changes in this preparation ?

A. The Sulphuric Acid combines with the Soda, forming Sulphat of Soda, and the Carbonic Acid unites with the Protoxide of Iron, forming a Carbonate of the Protoxide of Iron ; this Protoxide is precipitated green, but on exposure to the air, it is converted into a Peroxide, containing also a little Protoxide of Iron.

Q. How does it come to have Carbonic Acid in it?

A. It attracts it from the Subcarbonate of Soda.

Q. Why is it washed?

A. Lest it should contain any of the Sulphat of Soda.

Oxydum Ferri Nigrum.

Q. How obtained?

A. It is obtained at the Smith's forge, by laying a sieve over it; then applying the magnet, the black Protoxide of iron (formed by heat,) is attracted from the other impurities.

Q. Why is it put through the same process as Chalk?

A. To deprive it of any Carbon or Metallic Iron which it might contain.

Tinctura Muriatis Ferri.

Q. What is the old theory of this preparation?

A. The Muriatic Acid combines with the Subcarbonate of the Per and Protoxides of Iron, forming a Muriate of the Per and Protoxides, expelling the Carbonic Acid; then on being exposed to the air, the Protoxide is changed into a Peroxide, which, along with the Peroxide already formed, being soluble in Alcohol, are held in solution.

Q. Why is it exposed to the air for three days in an open vessel?

A. To convert the Protoxide into a Peroxide.

Q. Why must the Protoxide be changed into a Peroxide.

A. Because the Protoxide is not soluble in Alcohol.

Q. Why is it evaporated to one pound?

A. Because so large a quantity of Muriatic Acid would convert the Spirit of Wine into Muriatic Ether.

Q. If Muriatic Ether was formed, what would be the consequence?

A. The Peroxide of Iron would be deposited, not being soluble in Ether.

Q. What is the new theory of Sir H. Davy?

A. The Oxygen of the Peroxide and Protoxide, unite with the Hydrogen of the Muriatic Acid, forming water, and then the Chlorine combines, the Iron forming a Bichloride of Iron, which is afterwards dissolved in the Spirit of Wine.

Murias Ammoniæ et Ferri.

Q. What kind of Salt is this?

A. A Tripple Neutral Metallic Salt.

Q. Why is there a sudden heat used?

A. The Ammonia would sublime without the Iron.

Tartarum Ferri.

Q. What is the theory of this preparation?

A. The excess of Acid in the Supertartrate of Pot-ash, is saturated by the Peroxide of Iron, and the Carbonic Acid is expelled.

Q. Why is it filtered?

A. To take away any Tartrate of Lime, which the Crystals of Tartar might contain.

Q. Why is it filtered a second time?

A. Lest it might contain any of the Supertartrate of Pot-ash, which is not as soluble in cold water as in hot?

Q. Why is it kept in well-corked bottles?

A. Because it is a deliquescent Salt.

Acetas Ferri.

Q. What is the theory of this preparation?

A. The Carbonic Acid is expelled, and the Acetic Acid unites with the Peroxide of Iron, forming an Acetate of the Peroxide Iron.

Tinctura Acetatis Ferri.

Q. What is the theory of this preparation?

A. The Sulphuric Acid in the Sulphat of Iron unites with the Kali, forming Sulphat of Kali; then the Acetic Acid unites with the Protoxide of Iron, forming a Superacetate of the Protoxide of Iron, but on drying, this Protoxide attracting Oxygen from the atmosphere, is converted into a Peroxide, which is soluble in Spirit of Wine.

Q. Why are they rubbed together till they get soft?

A. Because there is no decomposition till they become soft?

Q. What makes them grow soft?

A. The water of crystallization, the new compound formed, not having so great a capacity for water as when separate.

Q. Why is there a mean degree of heat used?

A. A higher would decompose the Acetic Acid.

Q. What degree of heat is a medium degree?

A. From 100 to 200.

Q. What is the clear liquor decanted from?

A. The Sulphat of Pot-ash.

Q. What is the reason that in this preparation, should the bottle be ever so well corked, there will be a precipitate.

A. Because the Acetic Acid forms Acetic Ether with the Spirit of Wine, and the Peroxide of Iron is not soluble in Acetic Ether.

Preparations from Quick Silver.

Q. How is it obtained?

A. It is found native; it is found in great abundance in Spain, at Almaden, where it is extracted from the Ore called Native Cinnabar; it requires 39 degrees of cold below Zero, on Fahrenheit's Thermometer to freeze it, and then it is both malleable and ductile.

Hydrargyrum Purificatum.

Q. Why is it distilled?

A. To separate it from any foreign metals which it might contain.

Q. Why is there only four pounds distilled out of six?

A. Lest any of the impurities might come over.

Q. What are the impurities?

A. Lead, tin, and other metals.

Hydragyrum cum Magnesia.

Q. What is the theory of this preparation ?

A. The Manna divides the globules of the Mercury, and by their division and exposure to the air, the Mercury is converted into a Protoxide.

Q. Why is it washed in hot water ?

A. To take away the Manna.

Q. How would you know when it is well prepared ?

A. By rubbing some of it on polished Copper, if it contains any metallic Mercury it will adhere to the Copper.

Oxydum Hydrargyri Rubrum.

Q. What is the theory of this preparation ?

A. When the Mercury rises in a state of vapour in the neck of the glass vessel, it there meets with a column of cold air, from which it attracts Oxygen, is condensed, is ozidized, and becoming specifically heavier, down it falls, the Nitrogen of the decomposed atmosphere escaping, the Mercury is first converted into a black Oxide, then into a red.

Q. How is it known if it be adulterated with red Lead ?

A. The red Peroxide of Mercury is perfectly soluble in concentrated Muriatic Acid, but red Lead is not.

Q. What was the old name of this preparation ?

A. Hydrargyrus Calcinatus.

Oxidum Hydrargyri Sulphuricum.

Q. What is the theory of this preparation ?

A. Part of the Sulphuric Acid is decomposed, its Oxygen unites with the Mercury, forming a Peroxide of Mercury, which is afterwards dissolved by the remaining Acid ; then this Acid is evaporated, leaving behind a Supersulphat of the Peroxide of Mercury ; but on its being mixed with the hot water, the excess of Acid unites with the water, and then a Subsulphat is precipitated.

Q. Why is it washed ?

A. Lest there should remain any of the Supersulphat in it.

Q. How know when it is free from Supersulphate of Mercury ?

A. By the liquor in which it is washed not throwing down any Precipitate on the addition of a little pure Pot-ash.

Q. What would the Pot-ash form if it contained any of the Supersulphate of Mercury ?

A. The Sulphuric Acid would unite with the Potass, forming a Sulphat of Pot-ash, which would be held in solution, and the Peroxide of Mercury would be precipitated.

Oxidum Hydrargyri Nitricum.

Q. What is the theory of this preparation ?

A. Part of the Nitric Acid is decomposed ; its Oxygen unites with the Mercury, forming a Protonitrate and Pernitrate of Mercury, and Nitrous Oxide Gas is given out when the heat is increased, and all the Nitric Acid evaporated, the Nitrate of the Protoxide is converted into a Nitrate of the Peroxide.

Q. How proved that it is well prepared?

A. It should be soluble in Nitrous Acid.

Murias Hydrargyri Corrosivum.

Q. What is the theory of this preparation?

A. We have seen above that when metallic Mercury is dissolved in Sulphuric Acid by means of heat, and evaporated to dryness, that we obtained a Peroxide of the Supersulphat of Mercury; well then this Peroxide of the Supersulphat of Mercury is triturated with the Chloride of Sodium, the Oxygen of the Peroxide unites with the Sodium, forming Soda, with this Soda the Sulphuric Acid unites forming a Sulphat of Soda, then the Chlorine of the Chloride of Sodium unites with the Mercury and is sublimed, forming a Bichlorate of Mercury.

Q. What becomes of the Sulphat of Soda?

A. Being a fixed salt, it remains behind.

Q. How is the Mercury and Chlorine presented to each other?

A. Some say that the metallic Mercury is presented to the Chlorine Gas in its metallic mass; others that the Mercury rises in a state of vapour into the subliming vessel, where it meets with the Chlorine Gas, and these unites with it to form the Bichlorate of Mercury.

Q. How is the goodness of Bichlorate of Mercury proved?

A. It should be soluble in concentrated Muriatic Acid.

Submurias Hydrargyri Precipitatum.

Q. Account for the chemical changes in this preparation?

A. When Mercury is dissolved in Nitrus Acid assisted by heat, the result is both a Protonitrate and Pernitrate of Mercury; when these are mixed with the hot solution of Muriate of Soda, the Nitrus Acid in both Oxides combines with the Soda, forming a Nitrate of Soda, which is held in solution; then the Oxygen of the Oxides seizing the Hydrogen of the Muriatic Acid forms water, while the Chlorine unites with the Mercury forming a Chloride and a Bichlorate of Mercury.

Q. What does this preparation generally contain besides the Chloride and Bichlorate of Mercury?

A. A Subnitrate of Mercury.

Q. Why does it contain a Bichlorate?

A. Because heat was used in dissolving it.

Q. How does this preparation differ from Sublimed Calomel?

A. In the Subnitrate which it contains.

Q. But what became of the Bichlorate which you said was formed?

A. It has been washed away in the hot distilled water.

Q And why was not the Chloride and Subnitrate of Mercury washed away too?

A. Because they are not soluble.

Q. How known that it contains no more Bichlorate or Corrosive Sublimate?

A. When the distilled water in which it has been washed throws down no precipitate upon the addition of a few drops of water of Caustic Kali.

Submurias Hydrargyri Ammoniatum.

Q. What is the theory of this preparation?

A. The excess of Chlorine in the Bichlorate of Mercury unites with part of the Ammonia, forming a Chloride of Ammonia; then the rest of the Caustic Ammonia unites with the Chlorate of Mercury, forming a Chlorate of Mercury and Ammonia.

Q. In what degree of oxidation is the Mercury in this preparation?

A. It contains no Oxygen, but it consists of Chlorine Gas in combination with Mercury.

Q. What became of the Oxygen which it contained?

A. It never contained any; it was a Bichlorate.

Q. How is this White Precipitate known from the Sublimed and Precipitated Calomels?

A. Neither of the Calomels are soluble in concentrated Muriatic Acid, but White Precipitate is.

Submurias Hydrargyri Sublimatum.

Q. What is the theory of this preparation?

A. When the Bichlorate and Metallic Mercury are triturated together, the Bichlorate serves to mechanically divide the Metallic Mercury, which becomes oxidized by attracting Oxygen from the atmosphere, forming an imperfect Oxide, mechanically combined with the Bichlorate of Mercury;

but on subliming, the excess of Chlorine Gas dispossesses the Oxygen Gas, and converts the Protoxide into a Chloride, the Oxygen being expelled.

Q. Why sublime it twice?

A. Because part of the Bichlorate is sublimed unchanged.

Q. Why is it washed in hot distilled water?

A. To take away any of the Bichlorate that might adhere to it.

Q. Why is the mass triturated a second time before the second sublimation?

A. Because Metallic Mercury is sublimed the first sublimation.

Q. How is it known that it contains no more of the Bichlorate of Mercury?

A. When the liquor in which it has been washed throws down no precipitation on dropping a few drops of the Water of Sulphurete of Ammonia into it.

Q. How is this Chloride known from the Bichlorate?

A. The Bichlorate is soluble in concentrated Muriatic Acid, but the Chloride is not; they may also be distinguished by triturating them with Lime Water; the Bichlorate will be precipitated red, the Chloride black.

Q. How is the sublimed Calomel known from the precipitated Calomel?

A. The sublimed Calomel will be precipitated black, but the other will be grey.

Q. How does it happen that the Bichlorate is precipitated red by Lime Water, and the Chloride black, if neither contains Oxygen?

A. It takes place in this manner: the Bichlorate is able, on account of the Chlorine Gas, to decompose a double quantity of the Lime Water; hence there is two portions to form the Peroxide red, but the Chloride can decompose but one proportion of the Lime Water, hence the Protoxide black.

Q. How can this be true when Mercury is reckoned among those Metals, which do not decompose water?

A. We must recollect that those attractions which tend to destroy the original compound, and cause the subject matters to assume new arrangements, are called divellent affinities; hence no new arrangement of parts can take place in any mixture, unless this divellent attraction exists, (and here is the precise point at which we aim.) The Lime acts as a medium in causing this divellent attraction between the Lime Water and the Bichlorate and Chloride of Mercury.

Pulvis Hydrargyri Cinereus.

Q. What is the theory of this preparation?

A. Part of the Nitrus Acid is decomposed, its Oxygen unites with the Mercury, forming a Protoxide of Mercury; when the water of Subcarbonate of Ammonia is added, part of the Nitrus Acid unites with the Ammonia, forming a Nitrate of Ammonia, then the Carbonic Acid is expelled, while the Protoxide, and also a Subnitrate, are precipitated in combination with the rest of the Ammonia, forming a Protoxide of Mercury and Ammonia, and also a Subnitate of Mercury is precipitated.

Q. What degree of oxidizement is the Mercury in this preparation?

A. It was intended for a Protoxide, but it really contains some of the Peroxide.

Q. How does it happen to have any Peroxide in it.

A. Whenever heat is used in dissolving Mercury, there is always a Peroxide formed, and its grey colour also bespeaks some of the Submitrate of Mercury in this preparation.

Acetas Hydrargyri.

Q. Account for the chemical changes in this preparation?

A. We have remarked that whenever heat is used in assisting the solution of Mercury in Nitric Acid, the result is both a Protonitrate and Pernitrate of Mercury; when these are mixed with the solution of Acetate of Kali in hot distilled water, the Nitric Acid in both Oxides unites with the Pot-ash, forming a Nitrate of Pot-ash, and the Acetic Acid of the Acetate of Pot-ash, unites with the Oxides, forming a Protoacetate and Peracetate of Mercury.

Q. Why is it filtered while hot?

A. Because, if let to cool, the Protoacetate would crystalize, and consequently would be caught on the filter.

Q. What became of the Peracetate?

A. It remains in solution, and also the Nitrate of Pot-ash, while the Protoacetate crystallizes.

Q. Why are those crystals washed?

A. Lest they might contain any of the Peracetate or the Nitrate of Pot-ash.

Q. Why is the water cold in which the crystals are washed?

A. Because hot water would dissolve the crystals.

Sulphuretum Hydrargyri Nigrum.

Q. What is the theory of this preparation?

A. The Sulphur serves to mechanically divide the Mercury, which is oxidized by the atmosphere.

Q. How is it discovered if adultered with Ivory-black?

A. By subliming it, the Ivory-black will remain behind; it is also rendered soluble by Pure Pot-ash.

Sulphuretum Hydrargyri Rubrum.

Q. What is the theory of this preparation?

A. It is considered to be nothing more than a combination of Sulphur and Metallic Mercury.

Q. How is it rendered soluble in water?

A. By combining it with pure Pot-ash, one-third of the weight of the Pot-ash is rendered soluble in water.

Preparations from Lead.

Q. How is Lead obtained?

A. It is found native in Durham, in Derbyshire, and in many other parts of the world; but most of the Lead of Commerce is procured from the Mineral called Lead Glance or Galena.

Q. How many Oxides of Lead?

A. Three distinct Oxides, viz.:—the Protoxide, yellow; the Duetoxide, red; and Peroxide, brown.

Q. How is the Cerussa of Commerce prepared?

A. Sheets of Lead are rolled up in a spiral shape, and placed on a support over a vessel of Vinegar; many of these vessels are put together, and surrounded with horse dung, the heat of which rises the Vinegar in the state of vapour, which converts the Lead into a Subacetate of the Protoxide of Lead.

Acetas Plumbi.

Q. What is the theory of this preparation?

A. The distilled Vinegar unites with the Protoxide of Lead, forming an Acetate of the Protoxide of Lead.

Q. What kind of Salt is Acetate of Lead?

A. A Neutral Metallic Salt.

Liquor Subacetatis Lithargyri.

Q. What takes place in this preparation?

A. The Acetus Acid unites with the Protoxide of Lead, forming an Acetate of the Protoxide of Lead, which is dissolved by the remaining Vinegar.

Q. Why is it kept constantly stirred while boiling?

A. Because the Litharge would fall to the bottom, and its heat would be so much increased that it would decompose the Acetus Acid, and also be reduced to the metallic state

Q. What is Litharge?

A. A Metallic Salt, or a Subcarbonate of the Protoxide of Lead.

Preparations of Zinc. Zn 4.115

[illegible]

Q. How is Zinc obtained?

A. It is generally found in combination with the Ore Calamine, and also with that called Blende, ZnS in Derbyshire.

Q. What is Calamine?

A. An impure Subcarbonate of Zinc, consisting of Oxide of Zinc, and Carbonic Acid.

Q. In what degree of oxidizement is the Flores Zinci?

A. A Peroxide. [illegible]

Peroxidum Zinci.

Q. Why is there but one small piece put at once into the crucible?

A. Because the Zinc attracts Oxygen so rapidly from the air, that a white crust is almost instantaneously formed on it, which hinders the metal from being oxidized beneath it; hence we are desired to use only a small piece of Zinc at once.

Q. What takes place as soon as this crust of Oxide of Zinc is broken off from the metallic Zinc?

A. The Zinc inflames, and burns with a white flame, being at the same time converted into a very light flocculi.

Q. Why would it not do to lute on the inverted crucible?

A. The metal could not be oxidized without the access of the atmospheric air.

Tinctura Acetatis Zinci.

Q. What is the theory of this preparation?

A. The Sulphuric Acid unites with the Pot-ash, forming a Sulphate of Pot-ash, and the Acetic Acid unites with the Oxide of Zinc, forming an Acetate of the Peroxide of Zinc.

Q. How do you know when to add the Spirit?

A. By their becoming wet.

Q. Why is it not added sooner?

A. Because there is no decomposition sooner.

Q. What would be the consequence if the Spirit was added sooner?

A. The Acetate of Pot-ash would be dissolved undecomposed, and the Sulphat of Zinc would remain behind.

Q. Why is it macerated for a week?

A. To dissolve all the Acetate of Zinc.

Q. Why is it filtered?

A. To take away the Sulphat of Pot-ash.

Sulphas Zinci.

Q. What is the theory of this preparation?

A. Part of the water is decomposed; its Oxygen unites with the Zinc, forming a Peroxide of Zinc, which, being dissolved by the Sulphuric Acid, is converted into a Sulphat of the Peroxide of Zinc, while the Hydrogen of the decomposed water escapes in its gaseous state.

Q. How is the Sulphat of Zinc of Commerce obtained?

A. It is generally obtained from Blende, found in Germany, which is a Sulphuret of Zinc, which, by the agency of fire, water, and the access of the atmospheric air, the Sulphur is converted into Sulphuric Acid, which, uniting with the Oxide of Zinc, forms Sulphate of Zinc; but this preparation generally contains Iron.

Q. How is this got rid of?

A. By dissolving the Sulphite of Zinc in water, and exposing it to the air, the Iron attracting Oxygen both from the water and the air, is converted into a Peroxide, then precipitated.

Preparations from Arsenic.

Q. How is Arsenic obtained?

A. It is obtained in Saxony, during the operation of roasting the ores of Cobalt for the manufacture of Zaffre; in this, the Sulphur forms liver of Sulphur, and the Arsenic is sublimed.

Arsenias Kali.

Q. What are the chemical changes of this preparation?

A. Part of the Nitric Acid is decomposed; its Oxygen unites with the Oxide of Arsenic, forming Arsenic Acid, which, uniting with the Pot-ash, forms an Arseniate of Pot-ash that is sublimed, while the undecomposed Nitric Acid, with the Nitric Gas, pass over into a second receiver, where they are condensed in water.

Q. Is it for internal use that the Nitric Acid is ordered to be condensed?

A. No; but to prevent the chemist from being injured.

Of Oils.

Q. How are Oils classed?

A. Into fixed and volatile.

Q. What is meant by a fixed Oil?

A. Those Oils which cannot be volatilized without decomposition, or those Oils which remain unevaporated at a heat of 212.

Q. How are volatile Oils known to be adulterated with Oil of Olives, Oil of Almonds, Spirit of Turpentine or Alcohol?

A. Drop a little of the suspected Oil on paper, and expose it to the heat of the fire; if it leaves a greasy stain behind, it contains some fixed Oil; Alcohol is known to be present by the suspected Oil turning milky with water; and Oil of Turpentine is discovered by the smell, when a little of it is rubbed between the fingers.

Q. How should volatile Oils be preserved?

A. In small bottles, quite full, well corked, and in a cool place.

Q. If exposed to the action of air what is the result?

A. They will become rancid, by attracting Oxygen from the air, and be converted into a camphorated resinous substance.

Q. How is Castor Oil known to be adulterated with Oil of Olives, or any other Oils?

A. Castor Oil should be soluble in warm Alcohol; besides Castor Oil can be volatilized at a heat inferior to that of Olives of Almonds or Linseed; so that by dropping a little of the suspected Castor Oil on paper, and applying heat, if it leaves after it any greasy stain, it is adulterated.

Q. Is there any difference in the radicals of the volatile and fixed Oils?

A. Yes; the volatile Oils contain less Carbon in proportion to the Hydrogen than the fixed Oils.

Q. What is the difference between animal and vegetable Oils?

A. Vegetable Oils consist of Oxygen, Hydrogen, and Carbon; animal Oil consists of Oxygen, Nitrogen, Hydrogen, and Carbon.

Q. When vegetable Oils are burnt, what is the result?

A. The Oxyen and Hydrogen are evolved, and Charcoal is the result.

The Drying of Herbs.

Q. Why must they be dried while fresh?

A. Because they soon undergo the putrefactive fermentation.

Q. At what heat must they be dried?

A. From 90 to 100, and kept coustantly turned.

Q. How are the Narcotic Plants to be dried?

A. The best way is on sieves, excluding the light.

Q. Why is the light excluded?

A. Because it destroys their colour, and when the colour is gone their medicinal virtues are also destroyed.

Q. How are the leaves and powders of Digitalis and Cicuta to be preserved?

A. In opake bottles well corked.

Q. What age must these plants be of before they can be gathered?

A. Two years, being biennial plants.

Q. Why are they to be pulverized immediately after drying?

A. Because they would attract moisture from the atmosphere, and then would ferment.

Oleum Terebinthinæ.

Q. From what Tree is common Turpentine obtained?

A. From the Pinus Silvestris.

Q. Why is water added during the distillation?

A. To prevent burning.

Of Water.

Q. What are the radicals of water?

A. Oxygen and Hydrogen.

Q. In what proportions are those gases?

A. If estimated by their volume, water will be found to consist of two measures of Hydrogen, and one of Oxygen; but if by weight, there are 88 parts of Oxygen and 12 of Hydrogen in 100 parts of that fluid.

Q. How many forms does water generally assume?

A. Four, viz.:—fluid, ice, vapour, and enters into combination with other bodies.

Q. What is the boiling point of water?

A. 212.

Q. Can the temperature of water, in its simple state, be raised above 212?

A. No.

Q. Why not?

A. Because when arrived at that point, the vapour absorbs the heat and carries it off as fast as it is generated.

Q. Is there any means of raising the temperature above 212?

A. By means of Muriate of Soda it can be raised to 214, and also by means of pressure.

Q. Why does water in its evaporation produce cold?

A. Because it requires a large quantity of Caloric to convert it into vapour.

Q. Give an example?

A. When water is thrown on a red hot bar of iron, the water is immediately converted into vapour, and thus deprives the iron of the Caloric which it contains.

Q. When water is converted into vapour, what space does it occupy.

A. Eight hundred times greater than when in the form of water.

Q. What is the reason of this?

A. Owing to its expansion from the quantity of Caloric taken up.

Q. What is the freezing point of water?

A. Thirty-two degrees below Zero, on Fahrenheit's Thermometer.

Q. Is there any exception to this rule?

A. Yes; sea water does not freeze till brought down to the temperature of 25. 5.

Q. What is there peculiar in the freezing of water?

A. All fluids contract on the abstraction of Caloric, but water expands in freezing; aye, and expands with a force superior to the resistance of 13½ tons weight.

Q. Why is half an ounce of Rectified Spirit of Wine added to each pound of water distilled off vegetable substances.

A. To hinder it from fermenting.

Aqua Distillata.

Q. Why is water distilled?

A. To separate it from its impurities.

Q. What are these impurities?

A. Carbonate of Lime, Muriate of Lime, Muriate of Soda, and Sulphat of Lime.

Q. Why is the first pound rejected?

A. Because some of these saline and earthy Salts pass over.

Q. What effect has distillation on water?

A. It renders it specifically lighter.

Q. When water enters into combination with other bodies, what are they called?

A. Hydrates.

Q. What is there remarkable in the attraction between water and Alumina?

A. They unite so intimately, that Alumina will retain one-tenth of its weight of water at a heat which would melt iron.

Q. Which is it spring or river water that generally contains Sulphat of Lime?

A. Spring water.

Alcohol.

Q. Why is the Alkali and Muriate of Lime used in the distillation of Alcohol ?

A. To attract the water from the rectified Spirit of Wine.

Q. Why and how do they do this ?

A. Because they have a greater affinity for water than the Spirit has, and when they unite with the water, they render it more fixed, and counteract its volatility, so as to prevent it from rising in the distillation.

Q. Why are the Pearl-ashes dried first ?

A. Because substances when dried will take more fluid to wet them than they otherwise would.

Q. How is the strenght of Alcohol known ?

A. By its specific gravity.

Q. What is the specific weight of Alcohol ?

A. 815.

Q. How much water in 100 parts of Alcohol ?

A. It is not well known.

Q. How much water in 100 parts of rectified Spirit, of the specific gravity of 835 ?

A. Ten of water and 90 of Alcohol.

Q. What substances does Alcohol desolve ?

A. All the vegetable secretions, either wholly or partially, (Gum excepted,) also Ammonia Potash and Soda, in their pure or caustic state.

Q. What do you understand by proof spirit ?

A. A spirit, the Specific gravity of which is 930.

Q. How does the Dublin College make it ?

A. Four parts, by measure of rectified Spirit of Wine, are mixed with three of distilled water ?

Q. What is the difference between the Proof Spirit of the College, and that of Commerce?

A. That of Commerce always contains empyreumatic Oil, which the other does not.

Q. What substances will it dissolve?

A. It dissolves substances which neither spirit or water, when separate, will.

Q. As the Essential Oils are more soluble in Alcohol than water, why is it not used in preference to water in the distillation of these herbs?

A. There are many of the Essential Oils not volatized at the temperature at which Alcohol boils; hence it would pass over, owing to its great volatility, without being impregnated with any of the odour or pungency of the herbs.

Q. How is this obviated?

A. By using Proof Spirit.

Q. In how many officinal spirits is pure Alcohol used as the solvent?

A. Two; namely, the Spirits of Lavendar and that of Rosemary; these Oils being sufficiently voltile at that temperature, at which Alcohol distils.

Q. What is the boiling point of Alcohol?

A. It boils at 176.

Q. Why is water preferred to Alcohol in the distillation of herbs?

A. Because all the Essential Oils are volatilized at the temperature of 212; hence they must rise in distillation.

Q. What are the radicals of Alcohol?

A. Oxygen, Hyrogen, and Carbon.

Q. What are the proximate constituents of Alcohol?

A. Olefiant gas and water.

Q. When Alcohol is distilled with certain Acids, what is obtained?

A. Æthers, which derive their name from the Acid used in the preparation.

Liquor Ætherus Sulphuricus.

Q. Account for the chemical changes in this preparation?

A. According to Mr. Brand's opinion, (which, by-the-bye, is the most generally received one,) the Sulphuric Acid acts by the great affinity which it has for water, and that Ether is nothing more than Alcohol, deprived of one-half its weight of water.

Q. How does he prove this?

A. He says that if we remove all the water by a due proportion of Sulphuric Acid, we will then have nothing but Olefiant Gas.

Q. What are the most probable arrangements which the elements of Alcohol and Sulphuric Acid take during the distillation of Ethers?

A. Alcohol, consisting of Oxygen, Hydrogen, and Carbon; the Sulphuric Acid decomposes part of the Alcohol by subtracting its Carbon, which it converts into a carbonatious matter, somewhat bitumenous, this remains in the Sulpuric Acid, and also about one half of the undecomposed Alcohol, whilst the decarbonized Alcohol rises in the state of vapour which, on being condensed, is Ether.

Q. Why does not all the Alcohol rise in the form of Ether?

A. Because the Sulphuric Acid and the water gives so much fixity to the Alcohol that it requires a considerable heat to disengage it.

Q. How do you know this?

A. Alcohol boils under the atmospheric pressure at 176, wheras when mixed with an equal part of Sulphuric Acid it requires, 207° or 208°.

Q. Why is not Alcohol converted into Ether by simple distillation?

A. Because the heat at which it boils, and is volatilized, is not capable of decomposing it; but when it is fixed by the Sulphuric Acid, without being able to disengage itself, then that elevated temperature of ebullition which it undergoes must necessarily decompose it.

Q. How do you account for the Oil of Wine, the Acetic Acid, the Carbonic Acid, and the Sulphurus Acid which are also produced?

A. By dividing the process into different stages we shall be able to account for these different products very easily:—1st. We have seen that Ether is produced by a heat of 207°; and that after one-half of the Alcohol is decomposed, no more Ether is produced.—2dly. The liquor becoming so thick in the retort, that it requires a heat of 212° to keep up the ebullition, and at this temperature the first part of the water is disengaged from the Acid, and comes over; the heat still increasing, part of the Hydrogen of the decomposed Alcohol unites with a larger portion of the Carbon, and part of the Oxygen producing the Oil of Wine, this is distilled over after the Ether and water, and might be considered as Ether combined with a larger portion of Carbon; the temperature being still raised on account of the increased affinity of the Acid for the Alcohol, part of the Oxygen, Hydrogen, and Carbon unite in certain proportions forming Acetic Acid; this escapes in part without decomposition whilst another part of it is decomposed and converted into Carbonic Acid; lastly, the heat is now so high, that the Charcoal begins to decompose the Sulphuric Acid by deoxidizing it while a large portion of this Oxygen combines with part of the Carbon and Hydrogen forming Oxalic Acid, and then the Sulphurous Acid comes over.

Q. How do you account for the formation of so much water?

A. In the first part of the process the water is given out by the Sulphuric Acid, but in the latter part it is formed when the Charcoal begins to decompose the Sulphuric Acid.

Q. How do you know that it is the Sulphuric Acid which affords the water?

A. Because it has a much greater affinity for water than the Alcohol has; besides, water always constitutes a part of Sulphuric Acid, hence, when the Acid is changed from Sulphuric to Sulpherous Acid it is not so capable of condensing the water, because its strength is lessend, therefore more water is given out at the latter end of the process than at the beginning.

Q. Is this decomposition peculiar to Alcohol alone?

A. No, for in the distillation of every other vegetable matter or their immediate products, if they are confined without a possibility of escaping from the action of a brisk heat, they will be decomposed; hence, water, oil, acid and charcoal, are the result, and this is precisely the case in the formation of Sulphuric Ether.

Q. What is the use of the dried Subcarbonate of Kali?

A. To attract any water or Sulphurous Acid which might come over during the distillation.

Q. What is the difference between Alcohol and Sulphuric Ether?

A. Ether contains more Hydrogen and less Carbon than Alcohol.

Q. How would you know good Ether?

A. By its specific gravity, by it not dissolving any of the Muriate of Lime, and by it not being soluble in less than 10 parts of water.

Q. What is the specific gravity of Ether?

A. Seven hundred and sixty-five.

Q. If it dissolved any of the Muriate of Lime, what would you conclude?

A. That it contained Alcohol.

Æther Nitrosus.

Q. What is the rationale of this preparation?

A. The Sulphuric Acid first unites with the Pot-ash of the Nitrate, forming Sulphat of Pot-ash, then the Nitric Acid being set free is decomposed, and first part of its Oxygen unites with part of the Hydrogen of the Alcohol, forming water; another part of its Oxygen unites with the Carbon of the Alcohol, forming Carbonic Acid Gas, then one part of the Nitrogen unites with one part of Oxygen, forming Nitrus Oxide, whilst the remaining Nitrogen unites with two parts of Oxygen to form Nitric Oxide, part of which Nitric Oxide takes up still more Oxygen and is converted into Nitrus Acid, and Nitrogen is given off; secondly, the decomposition still proceeding, until all those Gases which were so loosely combined have assumed their respective arrangements, then more of the Oxygen of the Nitric Acid unites with the Hydrogen and Carbon of the Alcohol, forming Nitric Ether, and the remaining Oxygen unites in different proportions with the Hydrogen and Carbon of the Alcohol, which is still in the retort, forming both Acetic and Oxalic Acids.

Q. How does Nitric Ether differ from Sulphuric Ether, when the products are nearly the same?

A. Sulphuric Ether is a ternany compound, consisting of Oxygen, Hydrogen and Carbon; whereas Nitric Ether is a quaternary compound of Oxygen, Hydrogen, Nitrogen, and Carbon; besides the Nitric Acid is completely decomposed, and there is no Charcoal precipitated, the Carbon being carried off in the state of Carbonic Acid Gas.

Q. What is the specific gravity of Nitric Ether?

A. 900.

Q. How does it happen that it is more volatile than Sulphuric Ether, when its specific gravity is much higher?

A. Because it always contains, loosely combined, a portion of Nitrus Etherized Gas, which insinuates itself between the particles of the Nitric Ether, and thus destroys its attraction of aggration.

Q. Why is the Subcarbonate of Pot-ash put into the bottles after it is distilled?

A. To take away and neutralize any of the Acids which might be united with it.

Q. How would you know Nitric Ether from Sulphuric Ether?

A. By mixing them with a little tincture of Guaiacum; the Nitric Ether will turn green, then blue, and then brown; whilst the Sulphuric Ether will not act on it at all.

Q. In what quantity of water is Nitric Ether soluble?

A. In about 48 or 50 parts.

Q. How would you know Hoffman's Liquor from Sulphuric Ether?

A. By mixing them with water, Hoffman's Liquor will turn the water white on account of its oily properties; Ether will not.

Q. What is the Spiritus Ætheris Nitrici?

A. A solution of Nitric Ether in Alcohol.

Q. What are the Elastic Gases which burst forth in the making of Nitric Ether?

A. Nitrus Etherized Gas, Nitric Oxide Gas, Nitrus Oxide Gas, and Nitrogen Gas.

Q. How is Spiritus Æth: Nitrosi known from Sulphuric Ether, or Hoffman's Liquor?

A. If the Spirit of Nitre be good, it will have nearly the same effect on Tincture of Guaiacum as Nitric Ether.

Q. Why has it this effect on Tr: Guaic?

A. The Nitric Oxide of the Nitric Acid converts the risinous matter into artificial tannin.

Q. How know if Ether be adulterated with water?

A. It should hold Phosphorus in a clear solution.

Q. What effect has the Sulphurous Ether on Gum?

A. It coagulates Gum.

Q. At what time ought Ether be added to mixtures?

A. It must be put into the bottle last and immediately corked.

Q. What are the substances which Ether dissolves?

A. Several of the fixed Oils, nearly all the volatile Oils, Resins, a portion of Sulphur, Phosphorus, Oxides of Gold and Platinum; it also dissolves Camphor, and is the most powerful solvent of Caoutchouc, or Indian Rubber.

Q. In what state is Ether in vacuo?

A. In the state of Gas.

Q. What hinders it from being in a state Gas when out of the vacuum.

A. The pressure of the atmospheric air.

Spiritus Ammoniæ.

Q. What is the theory of this preparation?

A. The Muriatic Acid in the Muriate of Ammonia unites with the Pot-ash, forming Muriate of Pot-ash, and the Ammonia rises in a gaseous state along with the Spirit in distillation.

Q. Why is there only a medium heat used?

A. Lest any of the Muriatic Acid might come over into the receiver.

Spiritus Ammoniæ Aromaticus.

Q. What changes take place in this preparation?

A. The Ammonia in the Spirit unites with the essential Oils, forming a Soap of Ammonia, but it is instantly dissolved by the Spirit.

Q. Why is proof Spirit used in the distillation of the Spirit of Ammonia, in preference to Spirits of Wine or Alcohol.

A. Because the Alcohol or Spirit of Wine would rise before the Ammonia, and there would be no union formed, but the water gives such fixity to the Spirit, that it requires nearly the same heat to volatilize it as the Ammonia.

Of Tinctures.

Q. What do you understand by a Tincture?

A. They are spiritous solutions of vegetable, animal, and some saline substance; and also mineral substances.

Q. How many kinds of Tinctures?

A. Three; those made with Alcohol, those made with the Spirit of Wine, and those made with proof Spirit of Wine.

Q. How distinguish them from each other?

A. Those made with Alcohol generally hold pure resin in solution, the addition of a little water will precipitate the resin, or it will float on the top; those made with the Spirit of Wine will only become turbid by the addition of the same quantity of water as that used in trying the Alcohol; whereas those made with proof Spirit will have no precipitate, even when mixed with a very large portion of water, because these last generally contain only gum, tannin, and some extractive, with a small portion of essential oil.

Q. What rules are observed in making of Tinctures?

A. To reduce the ingredient to a coarse powder, the maceration be made in a close vessel, exposed to a heat of 80°, and frequently shaken.

Q. How must they be preserved?

A. In well-stopped bottles.

Q. Why so?

A. Because the spirit would evaporate, and the strength of the tincture would be altered.

Q. What advantages have tinctures over decoctions or infusions?

A. They possess the active matter of the ingredient more concentrated on account of the solvent power of spirit being much more than that of water; and also when kept in closed bottles they are not liable to decomposition, while watery preparations are.

Q. After the tincture is macerated for the given space of time, what is done?

A. It should be filtered through bibulous paper.

Q. Why not let it rest on the ingredients without filtering?

A. The inactive and grosser matter is liable to be dissolved, and the spirit would become so loaded, that there would be a copious precipitate.

Medicated Vinegars.

Q. What action has Vinegar on Vegetables?

A. It dissolves all those proximate principles which are soluble in water, and its acid seems to increase its solvent powers.

Q. Does Vinegar add to the medicinal virtues of herbs?

A. It modifies their medicinal qualities either by the chemical changes it occasions, or by its action on the stomach.

Q. What is the best solvent of the acrid matter of squills?

A. Vinegar, which it dissolves without changing its qualities.

Of Wines.

Q. What are the substances wine dissolves?

A. From the Alcohol which it contains, it dissolves part of the resin, the extract and essential Oils of vegetables, and by the water which it contains, it dissolves gum.

Q. Why is Wine a better solvent of some metals than either Alcohol or water?

A. Because it contains Tartaric Acid, which acts chemically on some metals.

Q. If medicated Wine, holding some vegetable matter in solution, be exposed to the air, what will the result be?

A. It will become acescent, and converted into medicated Vinegar.

Vingum Ferri.

Q. What is the rationale of this preparation?

A. The water in the wine is decomposed, its Oxygen and part of the Oxygen of the atmospheric air unites with the iron to form a Peroxide of Iron, which is dissolved in the wine, and the Hydrogen of the water is expelled.

Medicated Honeys.

Q. What is an Oxymel?

A. The combination of Vinegar and Honey.

Q. How is Honey purified?

A. By melting it on a slow fire, and scumming it while any of the wax rises to the surface.

Q. How would you know if Honey was adulterated with water, and thickened with flower?

A. By boiling it for a little it will become thick instead of thin.

Q. What heat must be used in making Oxymel Scillæ?

A. from 100 to 180.

Q. Why not use a stronger heat?

A. A heat of 212 will destroy the Acrid matter of the squill.

Of Syrrups.

Q. What are Syrrups?

A. They are solutions of sugar either in simple water, or in water containing some vegetable extract.

Q. What quantity of sugar does the Dublin College order to each pint of the fluid?

A. Except otherwise ordered, they direct 29 ounces, and if more be added, it will crystallize. and if less, it will ferment.

Q. How is Syrup clarified?

A. By triturating the white of egg with it, then applying the heat of a hot water bath, the egg will coagulate, rise to the top, and carry with it the impurities, which are then to be separated.

Q. Why not use the yolk of the egg?

A. Because it requires more heat to coagulate it than the white.

Q. At what temperature ought Syrups be kept?

A. At one not exceeding 55° or 56°.

Q. How is the sugar to be added to the liquor?

A. Added by degrees, when reduced to powder.

H. How long is it left to settle after making?

A. Twenty-four hours; then remove the scum, and decant off the clear syrup.

Q. What are the impurities?

A- Extractive and carbonaceous matters, which subside.

Q. What is to be particularly attended to in the making of Syrup?

A. To keep it frequently stirred, so as not to let the Sugar fall to the bottom and be burnt, and also not to increase the heat too much.

Q. When simple Syrup becomes sour, how would you act?

A. Some say that by mixing with it calcined egg-shells, or pure Lime, that the Acetic Acid will unite with the Lime, and that the heat used in boiling it will decompose the Acetic Acid, change it into Carbonic, forming a Subcarbonate of Lime, which is insoluble; but the surest way is to throw out the syrup, for it can hardly be recovered.

Q. What is the best test of good simple Syrup?

A. Its specific gravity being 1385, and the sugar forming very few and very small crystals at the bottom of the vessel.

Q. What quantity of sugar is used in making Syrup of Marshmallows?

A. Half-a-pound to the pint.

Q. Why is there not more?

A. Because the water has so large a quantity of the mucillage in solution, it requires less sugar to form the syrup into a proper consistence.

Syrrupus Limonis.

Q. Why is it fomented in a hot water bath?

A. To evaporate the essential oil, which is generally pressed out in squeezing the lemons, as this oil would make it mould very soon; and also to separate the extractive, and other substances.

Q. Why is it strained?

A. To separate the fecula, which subsides when it cools.

Q. Why does the mucillageous and extractive matters fall to the bottom?

A. Because they are not soluble in the acid, and their specific gravity is greater.

Inspissated Juices.

Q. What do you mean by Inspissated Juice?

A. That liquor expressed from succulent vegetables, which holds dissolved or diffused through it the medical virtues of the plant.

Q. What are the substances which it contains?

A. Mucillage extract, tannin, fecula, and a little resin.

Q. How is an inspissated juice known from a watery or spiritous extract?

A. By acting on them with Sulphuric Acid, the inspissated juice holds so much free Acetic Acid, that it will rise in the form of vapour, and redden the litmus; the juice will also give out the smell of Ammonia when rubbed together with Lime; these are characters which will always distinguish the inspissated juices, from watery or spiritous extracts.

Of Extracts.

Q. What is an Extract?

A. A Tenaceous mass, obtained either from the evaporated decoction or infusion, or tinctnre of vegetable productions.

Q. How many stages in making a watery extract?

A. Three:—1st. Boiling the water to the consumption of one-half—2dly. Letting it rest till the feculencies subside, from which it is to be decanted: 3dly. Evaporating to the proper consistence.

Q. Specify the different degrees of heat used?

A. In boiling the heat at 212, during the first stage of the evaporation the heat of 212, but when it acquires the consistence of syrup, the heat must be from 100 to 200, always remembering to stir it, lest it may burn.

Q. What is the best manner of preserving soft extracts?

A. By excluding them from the air, having previously sprinkled on their surface a little spirit of wine.

Q. In making the extract of Bark, what must be attended to?

A. During the boiling to keep the vessel covered, and to strain the liquor while hot.

Q. Why must the vessel be covered, and why strained while hot?

A. It will attract Oxygen from the air, if boiled in an open vessel, would be precipitated and converted into an insipid, inert matter; it is strained while hot, because the water holds more of the extractive and resin in solution, while hot than when cold.

Q. Why is several portions of water used?

A. Because the water becomes saturated, and is not capable of dissolving any more of the properties of the Bark.

Q. Why are the powdered Cardomom Seeds not added till the last when making the compound extract of Colocynth?

A. Because the heat would dissipate their essential oil.

Q. How is the extract of Hemlock known to be good?

A. It should be a dark-green colour, not mouldy, and should have no Alkaline effervescence on its surface.

Q. What is the best method of powdering the pith of Colocynth?

A. By immersing the Colocynth in a solution of Gum Tragacanth, then dry it, and reduce to powder.

Q. What are the ingredients now omitted in the compound myrrh pill?

A. The Gums Olibanum and Sagapenum.

Electuaries.

Q. How are pulps prepared?

A. Take the fruit, boil it in a little water till it becomes soft, then press the pulp through a hair sieve; and lastly, evaporate it to a proper crassitude.

Electuary of Senna.

Q. Why is the Oil of Caraway added last?

A. It would be evaporated if added sooner.

Q. What is meant by the syrup of Brown Sugar?

A. Treacle.

Q. Why is treacle preferred?

A. Because it is purgative.

Q. How is it obtained?

A. It is the incrystallizable part which remains after the preparation of Loaf Sugar.

Q. Why does it not crystallize?

A. Because it contains Mallic Acid, Carbonaceous matter, and Empyreumatic Oil.

Ointments.

Q. What is to be observed in making Ointments?

A. If resin is used, care must be taken in the melting not to raise the heat so much as to decompose it; if Calaminaris is to be added, it must first be prepared as Chalk, then added by degrees, when the ointment is nearly cold, remembering to keep it constantly stirred.

Ungt. Supernit: Hydrargyri.

Q. What is the theory of this preparation?

A. The Mercury is oxidized by the decomposition of part of the Nitric Acid, while it is dissolved by the remaining undecomposed acid, forming a Supernitrate of Mercury; this Oxide of Mercury unites with the Oil and Lard, forming something like a Soap of Mercury.

Q. What are the radicals of Wax?

A. Oxygen, Hydrogen and Carbon.

Q. How is it known when adulterated with Suet?

A. By not being soluble in boiling Ether.

Q. What is the active principle in French Flus?

A. A peculiar acrid substance called Cantharidin, which is very volatile; hence, if the flies be added to the other ingredients while melting them for Blistering Plaster, this active constituent will be dissipated.

Q. Does a heat 100 or 200 injure them?

A. No; but it seems to increase their activity.

Q. How is Spermaceti distinguished from fat?
A. Spermaceti is soluble in boiling Alcohol.
Q. What preparation of Zinc is Tutty?
A. An Oxide of Zinc.
Q. What preparation of Lead is Litharge?
A. A Subcarbonate of the Protoxide of Lead.

Extemporaneous Preparations.

Q. What is to be observed in making compound Lime Water?

A. To keep the vessel covered, because the Lime would be precipitated and the Essential Oils in the Sassafras and Coriander Seeds would be dissipated?

Q. Why is the Liquorice Root not added to any decoction till the last?

A. Because if boiled too long it will give out its bitter principle.

Q. At what time ought the Sassafras to be added to the compound decoction of Sarsaparilla?

A. At the same time the Liquorice is added.

Q. Why so?

A. We have seen above, that its Essential Oil would be expelled.

Q. What is the active constituent in Mezereon?

A. A peculiar substance called Daphnin.

Q. How is a Turpentine Enema prepared?

A. By taking either Spirit of Turpentine, or Venice Turpentine, triturating it with the yolk of an egg, then add to it by degrees the decoction of Chamemile at a heat of 90 or 100.

Q. Why is it not added while boiling?

A. The egg would be coagulated.

Q. Why is the yolk prefered?

A. Because it is not so easily coagulated as the white.

Q. If the Enema becomes cold before it is possible to use it, how is it to be warmed?

A. By immersing the bag in warm water.

Q. On what side is the patient placed while giving it?

A. On the left.

Q. Why so?

A. On account of the sigmoid fexure of the colon.

Q. Why is it not proper to boil Senna leaves?

A. Because they would become Oxidized, and the active principle would be destroyed.

Q. What is a resin?

A. A volatile Oil, rendered concrete by Oxygen Gas.

Q. What are the constituents of Oxygen Gas?

A. Oxygen and Caloric.

Q. How is good Scammony known?

A. It should be light and spongy looking, not containing any white or black spots, and when wetted with the tongue it should turn milky.

Q. As Resin is not soluble in water, what becomes of it in the Lac Ammoniaci?

A. It is held suspended in the water by means of the gum; hence the white colour of the Liquor.

Tinctura Acetatis Ferri cum Alcohol.

Q. What is the difference between this preparation and that which we have already described?

A. This one is made with Alcohol, having but one ounce of Acetate of Kali; the other is made with Spirit of Wine, and two ounces of Acetate of Kali.

Q. Why are there two ounces of Acetate of Kali used with the former preparation?

A. To convert the Spirit of Wine into Alcohol, by attracting its water.

Tinctura Muriatis Ferri.

Q. How does this differ from the other Muriated Tincture of Iron?

A. This contains none of the Protoxide of Iron, whereas the other does.

Q. What preparation of Iron does this contain?

A. The Peroxide or red Oxide.

Q. How would you distinguish the two preparations?

A. That prepared from the Subcarbonate of the Per and Protoxides, will always leave a greenish cast on the side of the bottle when shaken, but this made with the red Oxide will not.

Q. How is Lime, White Lead, Starch, Flower, or white precipitate, detected in Calomel?

A. By throwing a little of it on a red hot iron, the Calomel will sublime, leaving the Starch, Flower and Lime behind; but if it contains white precipitate it will give out the smell of Ammonia.

Q. How would you correct an over dose of Tartar Emetic?

A. By giving the decoction of yellow bark.

Q. How does this counteract its effects?

A. The Tartaric Acid unites with the Alkalies, called Cinchonin and Quinin, forming an insoluble Tartrate of Cinchonin and Quinin.

Q. What impurities does Subcarbonate of Pot-ash obtained from Pearl-ashes contain?

A. Muriate of Pot-ash.

Q. How much good lemon juice will saturate one drachm of each of the Subcarbonated Alkalies?

A. Ammonia requires from 23 to 24 drachms; Subcarbonate of Kali requires one ounce and a half; Subcarbonate of Soda, but one ounce.

Q. How much lemon juice will saturate one drachm of Subcarbonate of Magnesia?

A. From five ounces and one half to six ounces.

Q. What is the reason of this difference?

A. It depends upon the quantity of base in the given proportion of each Subcarbonate.

Q. Why is there more base in one drachm of Ammonia than in the same weight of Subcarbonate of Pot-ash or of Soda?

A. Because it has less water of crystallization.

Q. What is Camphor, and in what acid is it soluble?

A. It is a concrete sui generis, and ought to be soluble in Acetic Acid.

Q. Why do you say it "ought" to be soluble in Acetic Acid.

A. Because most of the Camphor of Commerce is nothing more than artificial Camphor, obtained by passing a stream of Chlorine Gas through Spirits of Turpentine; hence Acetic Acid is a test of the purity of Camphor.

Q. What effect has Magnesia on Camphor?

A. It renders it more soluble in water.

Q. How much water is twelve grains of Camphor soluble in?

A. In sixteen ounces.

Q. How is Camphor rendered misable in water?

A. By sugar, mucilage, and almonds.

Q. How would you make Spermaceti emulsion?

A. I would first make some mucilage of Gum-araback, and keep it hot, then melt the Spermaceti in a cup on a slow fire, and when melted, triturate it while hot with the warm mucilage in the mortar, (which had been previously warmed by pouring into it some boiling water,) then add the water by degrees with the sugar dissolved in it, and form an emulsion.

Q. How is artificial Tannin made?

A. By the action of Acids on Resin.

Q. How is Gallic Acid separated from Tannin?

A. By adding to an infusion of Galls some Muriate of Tin, the Tannin will unite with the Muriate of Tin, forming with it an insoluble precipitate, and the Gallic Acid will remain in solution.

Q. Which is Tannin or Gallic Acid the astringent principle?

A. Tannin.

Q. Which is it Tannin or Gallic Acid that gives colour to solutions of Iron?

A. The Acid.

Q. How are vegetables known to contain Tan, or Gallic Acid?

A. By adding a few drops of the Solution of Glue to the infusion of the substance under examination, if Tannin be present there will be a white precipitate; but if there be added a little solution of the Sulphate of Iron to the infusion and that it contains Gallic Acid, Ink will be the result.

Q. If a stream of Ammoniacal Gas be passed over Ignited Charcoal what will be formed?

A. Prussic Acid.

Q What are the new arrangements of the constituents?

A. The Nitrogen of the Ammonia unites with the Carbon, forming Cyanogen or Carburetted Nitrogen and the Hydrogen combines with this Cyanogen to form Prussic Acid.

Q. How much Lemon juice is equal to a drachm of concentrated Citric Acid?

A. One ounce.

Q. How is Citric Acid known to be adulterated with Tartaric Acid?

A. By adding Pot-ash to a solution of the suspected Acid; if Tartaric Acid be present there will be formed a Supertartrate of Pot-ash, which is precipitated.

Q. What is the best antidote against an over dose of opium?

A. First give an emetic of Sulphate of Zinc, and when the vomiting has ceased, give plenty of the infusion of Coffee, combined with Brandy, and as much Tincture of Hippo as will not excite vomiting.

Q. What is the best antidote against an over dose of Camphor?

A. Opium.

Q. How many parts of water is Arsenic soluble in?

A. In 15 of boiling, and 80 of cold water.

Q. What is the best antidote against Arsenic ?

A. Lime water, which precipitates it, producing a very insoluble Salt.

Q. What is the name of the Salt precipitated ?

A. Arsenite of Lime.

Q. Is this Arsenite of Lime left in the stomach ?

A. No; it must be thrown off by emetics.

Q. What is the best emetic in cases of metallic poisons ?

A. A Sulphate of Zinc, or Sulphate of Copper.

Q. Why are those better than Hippo or Tartar emetic ?

A. Because they do not purge, which would be carrying the poison farther into the system.

Q. How would you know if a person had been poisoned by Arsenic ?

A. By evaporating the contents of the stomach to dryness, then throwing the residuum on burning coals, if Arsenic be present, it will emit the smell of Garlic.

Q. How know Corrosive Sublimate to be the poison taken ?

A. By evaporating the contents of the stomach to dryness, then rubbing the residuum with Lime water, if it becomes red, Corrosive Sublimate is present.

Q. What is the best antidote against Corrosive Sublimate ?

A. White of eggs, which convert it into Calomel.

Q. How much Subcarbonate of Ammonia is in one ounce of the water of Acetate of Ammonia ?

A. None ; it is all Acetate of Ammonia.

Q. How much Benzoic Acid in one ounce of Balsam of Copaiba?

A. None; it is a liquid Resin, or a Turpentine.

Q. What constitutes a Balsam?

A. A Resin, an Oil, and Benzoic Acid.

Q. What does Turpentine consist of?

A. An Essential Oil and Resin.

Q. What is the green colour of Herbs owing to?

A. To the combination of Light, Hydrogen, and Carbon.

Q. If too much heat is used in drying Herbs, what takes place?

A. The Hydrogen of the Herb unites with the Oxygen of the Atmospheric Air, then it is driven off in vapour, while more of the Oxygen of the Air unites with the Carbon, forming Carbonic Acid Gas, which is also expelled, leaving behind nothing but Charcoal.

Q. Why is Sugar added to the infusion of Mint when the compound tincture of Cardomoms renders the Oil of Mint soluble in the infusion?

A. Because the solvent powers of the spirit are weakened by the water, but the sugar renders the oil misable in water.

Q. What are the proximate principles of fixed Oils?

A. Sterain and Elain.

Q. How are they obtained?

A. By freezing the Oil, and then pressing it through paper; that which remains between the fold of the paper like Suit or Spermaceti, is called Elain.

Q. How many species of Cinchona Bark?

A. Three; the pale, the red, and the yellow.

Q. What are the Botanic names of each species ?

A. Cortex Cichonæ Lancefolia, the pale Bark; Cortex Cinchonæ, Oblongifolio, the red Bark; aud Cordifolia, the yellow Bark.

Q. What are those proximate principles which are common to all ?

A. Tannin extractive, resin, red and yellow Colouring Matter, Lime, Starch, Gum, and Lignin.

Q. What are those substances which are peculiar to each ?

A. Cinchonin to the pale Bark, Quinine to the yellow, and both Cinchonin and Quinine are contained in red Bark.

Q. What is the nature of those substances ?

A. They are Akalies, and are capable of combining with acids, forming neutral Salts.

Q. How is it known that any substance contains Cinchonin ?

A. By adding to the infusion or decoction of the ingredient a little infusion of Galls, this will precipitate the Cinchonin.

Q, Why does the infusion of Galls precipitate the Cinchonin ?

A. Because the Gallic Acid unites with it, forming a gallate of Cinchonin.

Q. What effect has the Salts of Iron on the Cinchona Barks ?

A. They turn them black, forming Ink or Tannate of Iron.

Q. What are the proximate principles of Cascarilla ?

A. Gum, extractive, bitter principle, essential Oil, Water, Woody Fibre, and Resin.

Q. How is Cascarilla distinguished from pale Conchona Bark?

A. Cascarilla emits the smell of mosch when burned, the Cinchona will not, and the infusion of Cascarilla is not blackened by the Salt of Iron.

Q. What are the constituents of Rhubarb?

A. Gum, Resin, Extract, Tan, Gallic Acid, Phosphate of Lime, Malate of Lime, and Woody Fibre.

Q. What are the Constituents of Hippo?

A. Emitine, Gum, Starch, Fatty Matter and traces of Wax.

Q. What is the active principle in Hippo?

A. Emetine.

Q. From what substance is Kinic Acid obtained?

A. From Cinchona Bark.

Q. What are the constituents of Squills?

A. Gum, Tannin, and a peculiar bitter principle called Scillitine.

Q. What are the constituents of Opium?

A. Extractive, Resin, an Alkali called Morphia, and an Acid termed Meconic Acid.

Q. What are the constituents of Belladonna?

A. Vegetable Albumen, a bitter narcotic principle, Muriate, Sulphate, Oxalate, and Acetate of Pot-ash.

Q. What is the active principle in Belladonna?

A. An Alkali, named Atropia.

Q. What are the constituents of Black Henbane?

A. Gum extractive, a volatile Oil, a vegetable Albumen, Nitrate of Pot-ash, Nitrate of Ammonia, and a peculiar Alkali, called Hyoscymia, (in which its narcotic powers reside.)

Q. What are the constituents of Elaterium ?

A. Water extractive, Fecula, Gluten, Lignin, Elatin, and a bitter principle.

Q. What is the active principle of Elaterium ?

A. Elatin.

Q. What are the proximate principles of Hemlock ?

A. Water, Fecula, Ammonia, Resin, and a volatile Oil.

Q. What is the active constituent of Hemlock ?

A. A peculiar green Resin, called Concin.

Q. How much water is Morphia soluble in ?

A. In 400 parts of boiling water.

Q. If this be true, how is it that the watery extract can produce any effect, when there is only 48 parts of water used in the making ?

A. Opium contains an acid which renders the Morphia more soluble.

Q. What is the difference between extractive and an extract ?

A. An extract may contain many different substances, but extractive is only one peculiar vegetable substance.

Q. Why is heat generated during the mixing of the Sulphuric Acid in making of Acetic Acid ?

A. Owing to the opposite electricities of the Acid and Alkali ; hence it is that in the making of a salt, heat is generated ; but in the solution, heat is so rapidly absorbed that cold is produced.

Q. Why is so much water used in crystallization when it must be evaporated afterwards ?

A. Because the Acid and the Alkali have more power to act on each other while suspended in water, and their union is more perfect ; beside, the salt assumes more regular determinate arrangements during slow evaporation.

Q. What is the difference between watery extract of Opium and purified Opium ?

A. Purified Opium contains Resin, the watery extract does not.

Q. What is Opium ?

A. The inspissated or concrete juice of the Papaver Somniferum.

Q. How is it known if Quicksilver be adulterated with Lead, Tin, Bismuth, or Zinc ?

A. By dissolving the Quicksilver in Nitrous Acid, then diluting it with distilled water; if Bismuth be present, there will be a white precipitate; by passing a stream of Sulphuretted Hydrogen Gas through it, Lead will be precipitated of a dark colour ; a solution of Gold in Nitromuriatic Acid, diluted with distilled water, will precipitate Tin, of a purple colour, and heat will sublime the Zinc in the form of a white powder.

Q. What are the constituents of Balsam Copaiba ?

A. Resin and volatile Oil.

Q. What are the constituents of Liquorice Root ?

A. Starch, Gluten, Liquorice, Sugar, Phosphate and Malate of Lime, and Magnesia, an Acrid Oil and Lignum.

Q. What are the proximate principles of Iceland Moss ?

A. Sugar, Supertartrate of Potash, Tartrate of Lime, Phosphate of Lime, Bitter Principle, Wax, Gum, Starch, and Colouring Matter.

Q. What are the constituents of Senna?

A. An Oil, a peculiar extractive principle, and a Resin.

Q. What are the constituents of Gentian?

A. A substance like Bird-lime, Resin combined with Oil, bitter extractive Gum, Colouring Matter, and Phosphate of Lime.

Q. What are the constituents of Kino?

A. Tannin, Galic Acid, Oxide of Iron, Colouring Matter.

Q. What does Flour consist of?

A. Gluten, Starch, Albumen, Mucilage, and Sugar.

Q. If Tincture of Guaiacum is triturated in the mortar with Syrup, what takes place?

A. It will become quite green, if kept too long exposed to the air.

Q. How is Calomel formed into pills?

A. Triturate the Calomel with Ginger Powder, and then form it into a mass with Mucilage.

Q. How is Sublimate formed into pills?

A. By rubbing it in a glass mortar with Spirit of Wine until dissolved, then adding crumb of bread to form a mass, which is to be rolled out by an ivory spatula, making use of Arrow Root to hinder the pills from adhering.

Q. How is Nitrate of Silver made into pills?

A. By dissolving the crystals of the Nitrate of Silver in distilled water, (using a glass pestle and mortar,) then forming the mass with crumb of bread.

Q. What is the objection to making pills of the Subnitrate of Silver, as it exists in Lunar Caustic?

A. It contains Nitrate of Copper.

Q. How is Copper detected in Lunar Caustic?

A. By making a solution of it in distilled water, then immersing a piece of polished steel in it; if the steel meets with any copper in the solution, it will be coated with copper, because steel reduces that metal.

Q. What effect has Subcarbonate of Kali on Myrrh?

A. It forms a kind of Soap.

Q. Do you know any vegetable substance which contains Prussic Acid?

A. Bitter Almonds, Laurel, &c.

Q. What dose of Prussic Acid can be given?

A. From two to eight drops, in distilled water, Almond emulsion, or infusion of Cinhona?

Q. How is Iodine given?

A. In the form of a tincture, from ten to fifteen drops on sugar and water.

Q. What do you understand by an Hydriodate?

A. Iodine, combined with a solution of pure Pot-ash.

Q. What is the dose of this last preparation?

A. From 6 to 10 drops in the same liquid as the Tincture.

Q. How should Colchicum be dried?

A. At a heat not exceeding 100 of *F*ahrenheit, the bulbs having been first sliced transversely.

Q. What quantity of the powder is used in making the wine of?

A. One ounce and one half to twevle of Sherry wine.

Q. How many drops for a dose?

A. From twenty to one dr in water only, or in an effervescing draught of Magnesia.

Q. How make up the following prescriptions ?

Rs. Infus: Sennæ ℥v Mannæ Sulphat: Magnesiœ áá ʒv Flectuarii Scammonii scrup: Tincturæ Sannæ semunc : M Sumt. Cochl : ii ampl. tertiis horis ad plenam purgationem.

A. First make the infusion of Senna, and strain, then dissolve the Epsom Salts and Manna in it, strain again ; lastly, triturate the Electuary of Scammony with the tincture in the mortar, and add the infusion by degrees, continuing the trituration during the addition.

Q. Why is the Electuary triturated with the tincture ?

A. In order to make the Resinous matter of the Scammony misable in the watery infusion which would be more perfect if a little sugar was added to the Electuary, while rubbing it with the tincture ?

Q. How is the following mixture compounded ?

Rs. Syr : Limoni : Ol: Amyg : áà unc Aq. mint. pip : unc : Spt : Cor : Cer: drs : iii M. ad formandum mistura sumt : unc : ii tussi urgenti.

A. First put the Oil of Almonds and the Spirits of Hartshorn into the bottle, shake them well together, then add the Peppermint Water, and lastly, the Syrup of Lemon.

Q. Is this a chemical mixture ?

A. No.

Q. Why and wherefore ?

A. Because the Ammonia of the Subcarbonate unites with the Citric Acid in the Syrup of Lemon, forming a Citrate of Ammonia ; the Carbonic Acid is expelled, and the Oil having lost the Ammonia (which acted as an intermedium in rendering it soluble in water,) now floats on the top.

Q. How did the Ammonia act as an intermedium in rendering the Oil soluble in water.

A. The Subcarbonate of Ammonia being an Alkaline Salt, with an excess of Ammonia, formed a Soap with the Oil which is soluble; but no sooner is the Alkaline Salt converted into a neutral Salt, by the Citric Acid, than the decomposition mentioned above ensues.

Q. How much do Squills lose by drying?

A. Four-fifths of their weight.

Q. What are the constituents of burnt Sponge?

A. Carbonated Lime, Phosphate of Lime, Carbonate of Soda, and Iodine.

A. What is the active principle in Sponge and Sea-wrack?

A. Iodine.

Q. What is Iodine?

A. It is supposed to be a simple substance, and a supporter of combustion.

Q. How is any substance known to contain Iodine?

A. By its peculiar action on Starch, turning it to a blueish purple colour.

Q. How is Subcarbonate of Ammonia formed into pills?

A. With Extract of Gentian or Jelly of Soap.

Q. Is it proper to send them out in a box?

A. No; they should be silvered, and sent out in well-corked bottles.

Q. What takes place in the following unchemical mixture—Sulphate, of Zinc, ten grains, Aromatic Confection two drachms, and Cinnamon water five ounces, form a mixture, take a tablespoonfull post singulas sedes liquidas?

A. A Sulphate of Lime and an Oxide Zinc, are precipitated.

R. What are the Gases which compose Subcarbonate of Ammonia?

A. Hydrogen, Nitrogen and Carbonic Acid Gas.

Q. What are the proportions of Alkali, water, and Carbonic Acid, in the Subcarbonate of Soda, the Subcarbonate of Pot-ash, and the Subcarbonate of Ammonia?

Soda	21	58	Pot-ash,	60	Ammon.	43
Carb: Acid	24	42	Acid Carb.	28	Acid Carb.	45
Water	64		Water	6	Water	12
In 100 parts.			In 100 parts.		In 100 parts.	

The Acid varies in this last according to the heat used in making.

LIST OF SPECIMENS.

Scammonium,
Stramonium,
Rad: Jalapae,
—— *Rhei,*
—— *R: Senika,*
—— *Serpentariae,*
—— *Scillæ,*
—— *Colombæ,*
—— *Valerianæ,*
—— *Helebori Nig:*
—— *Bistortæ,*
—— *Tormentillae,*
—— *Briony,*
Rad: Rat:
Boletus: Ignarius,
Lactuca, how obtained.
Colchicum Autumnale,
Capsici, Fructus,

3. *Cort: Cinchonae:*
—— *Cascarillae:*
—— *Angusturae,*
—— *Semaroubae,*
—— *Geoffreae Inermis,*
—— *Angellica,*
—— *Quassia,*
—— *Dulcamaræ,*
Fol: Hyosciami,
—— *Cicutæ,*
—— *Belladonnae,*
—— *Digitalis,*
Fol: Buchu,
—— *Uva Ursi,*
—— *Sennae,*
—— *Cassia Fistula.*

APPENDIX.

Acidum Benzoicum.

Q. What is the theory of this preparation?

A. The Benzoic Acid unites with the Lime, forming a Benzoate of Lime, which is held in solution; but when the Muriatic Acid is added, it dispossesses the Benzoic Acid, forming a Muriate of Lime: this is held in solution, whilst the Benzoic Acid is precipitated, which is afterwards to be sublimed.

Q. Why use newly burned Lime?

A. Because it contains no Carbonic Acid.

Q. Why add the Muriatic Acid by degrees?

A. If added at once, the heat evolved would be so great that the Benzoic Acid would sublime too soon.

Q. Why is it filtered?

A. To take away the impurities, the resin, and the other constituents of the Benzoin.

Acidum Citricum.

Q. What are the chemical changes of this preparation?

A. The Citric Acid unites with the Lime, forming a Citrate of Lime, while the Carbonic Acid escapes; but when the Sulphuric Acid is added, it takes possession of the Lime, forming a Sulphate of Lime, and the Citric Acid is set at liberty.

Q. What becomes of the Sulphate of Lime in this preparation?

A. It remains on the filter, whilst the Citric Acid passes through it.

Acidum Prussicum.

Q. What is the theory of this preparation?

A. The Muriatic Acid unites with the Oxide of Mercury, forming a Muriate of Mercury, and the Prussic Acid is distilled off with the water.

Q. Why is it to be preserved in the dark and in the cold?

A. Because heat and light decompose it.

Acidum Tartaricum.

Q. What is the rationale of this preparation?

A. First the excess of Tartaric Acid unites with the Lime (at the same time disengaging the Carbonic Acid), forming a Tartrate of Lime, which is precipitated. There remains then in solution a Tartrate of Pot-ash, which is decanted off; but when the solution of Muriate of Lime is added, the Acids mutually exchange their bases, then a Muriate of Pot-ash is formed, and held in solution, while the Tartrate of Lime is precipitated. Lastly, when the Sulphuric Acid is added, it seizes on the Lime, forming an insoluble Sulphate of Lime; the Tartaric Acid, being then disengaged, crystallizes upon the usual process of evaporation and refrigeration.

Q. Why is the Tartrate of Lime so often washed?

A. The first ablution is to remove all the Tartrate of Pot-ash; the second to wash off the Muriate of Lime.

Q. Why is it digested for three days?

A. That the Sulphuric Acid may more perfectly unite with the Lime, thereby disengaging all the Tartaric Acid.

Barytæ Murias.

Q. What chemical changes take place during the formation of this Salt?

A. The Charcoal robs the Sulphuric Acid of its Oxygen, which, uniting with part of the Carbon, forming Carbonic Oxide or Carbonic Acid; is expelled, then a Sulphuret of Barytes remains behind; when this is boiled, the water is decomposed into its radicals, "Oxygen" and "Hydrogen;" first one part of the Hydrogen unites with one part of the Sulphur, forming an Hydro-sulphuret, which unites with part of the Barytes, forming an Hydrosulphuret of Barytes; again, two parts of the Hydrogen of the decomposed water unite with two parts of Sulphur, forming an Hydroguretted Sulphuret, which, uniting with the remaining part of the Barytes to form an Hydroguretted Sulphuret of Barytes; but when the Muriatic Acid is added, it seizes on the Barytes, forming a Muriate of

Barytes—the Sulphuretted Hydrogen is then evolved.

Q. Why is it filtered ?

A. To remove the Charcoal.

Q. Why is it roasted for four hours with the Charcoal ?

A. To assist the Coal to decompose the Sulphuric Acid.

Calcis Phosphas Præcipitatum.

Q. What is the theory of this preparation ?

A. The Muriatic Acid unites with part of the Lime, forming a Muriate of Lime, and that part of the Phosphoric Acid which was displaced by the Muriatic again combines with the remaining part of the undecomposed Phosphate of Lime, forming a Superphosphate of Lime, which, being a soluble Salt, passes through the filter with the Muriate of Lime; but when the water of Caustic Ammonia is added, the Muriatic Acid quits the Lime to unite with the Ammonia, and again the Phosphoric Acid returns to the Lime, (just now quitted by the Muriatic Acid,) to form the Calcis Phosphas Præcipitatum.

Sulphur Antimoniatum Fuscum.

Q. What is the theory of this preparation ?

A. The water is decomposed, its Oxygen combines with the Antimony, forming an Oxide of Antimony ; the Hydrogen of the decomposed water unites in lesser and greater proportions with lesser and greater proportions of the Sulphur, forming both an Hydrosulphuret and an Hydroguretted Sulphuret; these unite with the Oxide of Antimony, producing Hydro and Hydroguretted Sulphurets of Antimony, both of which are held in solution by the Caustic Pot-ash, and precipitated when the Sulphuric Acid is added in sufficient quantity to saturate the Pot-ash.

Hydrargyri Murias Corrosivum.

Q. What are the chemical arrangements in this preparation?

A. The Sulphuric Acid combines with the Soda, forming Sulphate of Soda; the Chlorine Gas and Chloric Acid are disengaged: first, the Chlorine Gas unites with the Mercury, forming a Chloride of Mercury (whilst the Oxygen Gas is given off); with this Chloride the Chloric Acid combines, forming an imperfect Bichlorate of Mercury, which sublimes.

Q. How is it proved to be an imperfect Bichlorate, and not a Bichloride?

A. Chlorine Gas, as also Oxygen, does not render metals soluble in water, unless that Chloride or that Protoxide be saturated with an Acid, and there are some metals which require to be supersaturated before they become soluble; now, Corrosive Sublimate is soluble in water; no Chloride or Bichloride is soluble in water: therefore, Corrosive Sublimate is not a Chloride nor a Bichloride.

Q. How do you know that it is not a Bichlorate?

A. If it was a perfect Bichlorate it would be more soluble in water, which may be proved by dropping a few drops of Muriatic Acid into it, which forming a Supermuriate, it is rendered perfectly soluble in a small proportion of water; and this is the very thing which takes place when Sal-Ammoniac is mixed with Corrosive Sublimate to make it more easy of solution.

Q. Why do you call this an imperfect preparation?

A. Because it is a compound of a Chlorate and a Bichlorate.

Q. Have you any other reason to prove that it is Chloric or concentrated Muriatic Acid which is combined with the Mercury?

A. Yes, every tyro in Chemistry knows that Chlorine Gas will not unite with Lime, or render it soluble in water; but when you triturate Corrosive Sublimate with water, it is evident that the Chloric or concentrated Muriatic Acid combines with the Lime and the Peroxide of Mercury is precipitated, the Chlorate of Lime remaining in solution. Add to this mixture only a few drops of Muriatic Acid, and you will again have a transparent mixture.

Q. What does Calomel consist of?

A. A Chlorate and Subchlorate of Mercury, but the quantity of Chlorate is very small.

Hydrargyri Cyanureti.

Q. What are the Chemical changes of this preparation?

A. The Nitric Acid unites with the Oxide of Iron, forming a Nitrate of Iron; then the Prussic Acid combines with the Oxide of Mercury, producing the Cyanurate, or Prussiate of Mercury.

Potassæ Hydriodas.

Q. What are the Chemical changes in this preparation?

A. The water is decomposed, its Oxygen combines with the Iron, forming an Oxide of Iron; the Sulphuric Acid unites with this Oxide to form a Sulphate of Iron; the Hydrogen of the decomposed water unites with the Sulphur, forming Sulphuretted Hydrogen, which passes over into the vessel containing the Iodine, with which it unites, forming a Superhydroguretted Sulphuret of Iodine; but when the Water of Subcarbonate of Pot-ash is added, the excess of Hydrosulphuret (possessing all the qualities of an acid) unites with the Pot-ash, producing an Hydrosulphuret of Pot-ash and Iodine—at the same time expelling the Carbonic Acid.

Q. Do you know any salt which will serve to illustrate this preparation?

A. Yes; the Acid in Tartar-emetic unites with two bases, (the Antimony and Pot-ash,) forming a triple Salt, viz. Tartrate of Antimony and Pot-ash. Now, this is precisely the case in the above Salt: the Sulphuretted Hydrogen unites with the Pot-ash, and the Iodine forming a triple Salt, consisting of a Sulphuretted Hydrate of Pot-ash and Iodine.

Q. Why is it dissolved in Spirits?

A. To purify it.

Quininæ Sulphas.

Q. What Chemical changes take place during this process?

A. The Sulphuric Acid unites with the Quinine of the Bark, which is dissolved in the water. The gum, the extract, and the tannin, are also dissolved, and pass the filter, leaving the resin and woody fibre behind; but when the Lime is added, the Sulphuric Acid quits the Quinine to unite with the Lime, forming a Sulphate of Lime, which is precipitated and along with it the Quinine; this Quinine is afterwards dissolved by the Rectified Spirit (the Sulphate of Lime being insoluble); and when the Spirit is evaporated you have the Quinine, to which is added the Sulphuric Acid to form the Sulphate of Quinine.

Q. What remains on the filter after the Lime is added?

A. The Sulphate of Lime and Quinine.

THE END.